

Economic Data Collection Program

Mothership Report (2009-2015)

Erin Steiner, Amanda Warlick, Marie Guldin, Lisa Pfeiffer

National Marine Fisheries Service

Northwest Fisheries Science Center¹

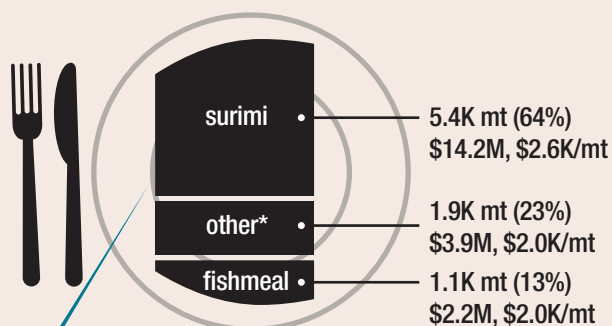
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¹ For questions or comments, please contact the EDC Program at [nwfsd.edc@noaa.gov](mailto:nwfsc.edc@noaa.gov).

2015 Economic Data Collection (EDC) West Coast Groundfish Trawl Catch Share Program

MOTHERSHIP

PACIFIC WHITING FLEET-WIDE PRODUCTION SUMMARY



All products:
8.4K mt
\$20.3M, \$2.4K/mt

*other includes: minced, fillets, fish oil, headed and gutted, and round, combined for confidentiality.



product recovery rate

PURCHASES & PRODUCTION

West Coast Purchases

Total purchases: 27,500 mt
Purchase price: \$191/mt

Engine: 5450 hp
2014 Vessel market value: \$56.5M
2014 Replacement value: \$122M

Fuel use
Usage: 250K gal/season
Daily usage: 5.7K gal/day
Total fuel cost: \$0.7M

Observer cost: \$32.2K

Processing equipment: \$319K
Processing crew: 80
Compensation: \$11.4K per person

Non-processing crew: 28
Compensation: \$27.7K per person

AVERAGE VESSEL

Food cost: \$154.5K

347 ft average length

Total Mothership Allocation: 71,200 mt
Total Non-Tribal US Pacific Whiting TAC: 325,072 mt

ECONOMIC SUMMARY*

Vessel Average

\$6.8M revenue
\$5.1M variable costs
\$1.6M variable cost net revenue
\$2.4M fixed costs
-\$0.8M total cost net revenue

\$30.3K variable cost net revenue
per day

Fleet-wide Totals

3 vessels
\$20.3M revenue
\$4.9M variable cost net revenue
-\$2.4M total cost net revenue

ALASKA & WEST COAST PARTICIPATION

Number of vessels operating in Alaska: 3
Total fleet-wide trips to Alaska: 12
Total purchases in Alaska: 109K mt

WC DELIVERY PORTS

of vessels offloading in each port

Bellingham (1)

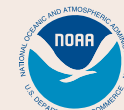
Seattle (2)

(All motherships reported
Seattle as their home port.)

Annual production per vessel: 2.8K mt

FISHERY PARTICIPATION

	Days at Sea
Average days processing and steaming on the West Coast	55
Average days steaming to and from Alaska	23
Average days operating in Alaska	120



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*Note that some off-board costs are not collected. Therefore reported net revenue is an overestimate of actual net revenue.

www.nwfsc.noaa.gov/edc/reports

Mothership Sector: 2015 Highlights¹

In 2015, three motherships owned by three companies processed Pacific whiting on the West Coast.

- The mothership fleet generated \$19.1 million in income and supported 461 jobs from purchases of Pacific whiting caught in the catch share program.
- The fleet spent 58% of its time operating in Alaska, 27% of its time processing and steaming on the West Coast, 4% of its time offloading fish on the West Coast, and 11% of its time steaming between the West Coast and Alaska.
- West Coast motherships delivered to two ports: Blaine/Bellingham and Seattle. All three motherships list Seattle as their home port.
- Motherships caught less of their Pacific whiting allocation (71,200 metric tons) in 2015 compared with previous years, likely due to anomalous ocean conditions.
- While operating on the West Coast, motherships employed an average of 80 processing and 28 non-processing crewmembers that were compensated approximately \$11,400 and \$27,700 per year, respectively.
- Average compensation for processing and non-processing crewmembers has grown by 93% and 139%, respectively, compared to the pre-catch share baseline period (2009 and 2010).
- The fleet's price paid to catcher vessels for fish purchases in 2015 (\$191 per metric ton) was lower than pre-catch share years (\$200 per metric ton).
- The average revenue for all product types was \$2,410 per metric ton in 2015, a 3% decrease from the baseline period.
- Surimi production comprised the largest portion of revenue, with an average production value of \$2,630 per metric ton in 2015, similar to the baseline period.
- Fishmeal had an average production value of \$2,000 per metric ton in 2015, a 4% increase compared to the baseline period.
- Vessels generated an average revenue of \$6.76 million and spent about \$7.56 million in fixed and variable costs, leading to a total cost net revenue of approximately -\$803,000 per vessel for the year, representing the lowest net revenue since the beginning of data collection.
- Motherships earned \$122,000 and spent \$91,600 per day in variable costs, leading to a daily variable cost net revenue of \$30,300 in 2015, a 25% decrease from 2014.

¹ Values reported in inflation-adjusted 2015 dollars. The pre-catch share baseline period is defined as the years 2009 and 2010. Despite having had historically low TAC in 2009 and 2010, these years are used as the baseline due to the burden on participants of requesting additional years of data.

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We thank PacFIN and AKFIN staff for providing access to important landings, permit, and vessel data. The staff at ODFW, WDFW, and CDFW also contributed with data used for the fielding of the baseline data collection. Other data and assistance with data interpretation were provided by the At-sea Hake Observer Program and the West Coast Observer Program.

We thank the Pacific Fishery Management Council and advisory bodies for their valuable comments on the EDC reports and data.

Finally, we thank the members of the West Coast fishing industry who met with us to discuss the development and implementation of data collection processes. We appreciate the time and effort of each participant that will continue to help improve the program in the coming years.

Report Introduction

About the Report

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and comprises over 90 different species of fish. Fish are harvested both commercially and recreationally. The commercial fishery has four components: limited entry with a trawl endorsement, limited entry with a fixed gear endorsement, open access, and tribal. In January 2011, the West Coast Limited Entry Groundfish Trawl fishery transitioned to the West Coast Groundfish Trawl Catch Share Program. The catch share program consists of cooperatives for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet.²

The Economic Data Collection (EDC) Program is a mandatory component of the West Coast Groundfish Trawl Catch Share Program, collecting information annually from all catch share participants: catcher-processors, catcher vessels, motherships, first receivers, and shorebased processors. The EDC information is used to monitor the economic effects of the catch share program, and consists of data on operating costs, revenues, and vessel and processing facility characteristics.

This report summarizes information collected from the West Coast mothership fleet. The EDC reports are also produced for the other sectors, and currently cover the years 2009 to 2015. The 2009 and 2010 data were collected in 2011 to provide a baseline of pre-catch share information. There is a one-year lag in collecting the EDC data to allow companies to close their accounting books. Thus, 2015 data were collected from May to September 2016. The EDC reports are updated annually to disseminate the data and contextualize its interpretation. The reports also serve as a catalyst for feedback on the data collected and its analysis. The scope of these reports continues to expand and the methods are refined with each publication.

The report is composed of three major sections. The first section, Mothership Overview (beginning on page 8), is an in-depth summary that contains descriptive analyses focusing on activities during 2015. The second section, Mothership Data Summaries (beginning on page 25), provides tables of all of the data collected from 2009 to 2015, with a detailed discussion of the methods used to summarize the data. The third section, Mothership Data Analysis (beginning on page 46), contains information about cost disaggregation and calculations of net revenue and economic performance. The data that form the basis for this report are confidential and must be aggregated or not shown so that individual responses are protected. More information about EDC Program administration, the EDC forms, data quality controls, data processing, and safeguarding confidential information can be found in the EDC Administration and Operations Report.³

² Information about the Catch Share Program is available at http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

³ Economic Data Collection Program, Administration and Operations Report available at: <http://www.nwfsc.noaa.gov/edc>.

Background - Economic Data Collection and West Coast Groundfish Trawl Catch Share Program

The economic benefits of the West Coast groundfish trawl fishery and the distribution of these benefits were expected to change under the West Coast groundfish trawl catch share program. To monitor these changes, the Pacific Fishery Management Council (PFMC) proposed the implementation of the mandatory collection of economic data. Using data collected from industry participants, the EDC Program monitors whether the goals of the catch share program have been met.

Many of the PFMC's goals for the catch share program are economic in nature. These goals include: provide for a viable, profitable, and efficient groundfish fishery; increase operational flexibility; minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical; promote measurable economic and employment benefits through the harvesting, processing, distribution, and support sectors of the industry; provide quality product for the consumer; and, increase safety in the fishery.

The EDC Program is also intended to help meet the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requirement to determine whether a catch share program is meeting its goals, and whether there are any necessary modifications of the program to meet those goals. The data submitted to and analyzed by the EDC Program will be fundamental to the formal 5-year review of the catch share program required under the MSA.

Monitoring the economic effects of a catch share program requires a variety of economic data and analyses. The primary effects of a catch share program can be captured in two broad types of economic analysis: 1) economic performance measures, and 2) regional economic impact analysis. Both of these require information on the costs and earnings of harvesters and processors.

Economic performance measures include: costs, earnings, and profitability (net revenue); economic efficiency; capacity measures; economic stability; net benefits to society; distribution of net benefits; product quality; functioning of the quota market; incentives to reduce bycatch; market power; and, spillover effects in other fisheries. Some of these measures are presented in this report, while others would require more specific and involved analysis using EDC data.

Regional economic impact analysis measures the effects of the program on regional economies. The catch share program will likely affect different regional economies in different ways. Regional economic modeling involves tracking the expenditures of all businesses, households, and institutions within a given geographic region to arrive at the effects on income and employment. On the West Coast, the Northwest Fishery Science Center's IO-PAC model⁴ is used to estimate regional economic impacts using data from both the EDC survey forms and the voluntary cost earnings survey as model inputs.⁵

⁴ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

⁵ For more information on cost earnings survey data collection process, see the Administration and Operations Report Draft Report (May 2016).

OVERVIEW

Management Context

In January 2011, the West Coast Limited Entry Groundfish Trawl fishery transitioned to the West Coast Groundfish Trawl Catch Share Program, consisting of an individual fishing quota (IFQ) program for the shorebased trawl fleet and cooperatives for the mothership and catcher-processor fleets. This report focuses on mothership vessels, which process fish delivered at sea by catcher vessels. The at-sea Pacific whiting fishery also includes catcher-processors, which are vessels that both catch fish and process them on-board. In 2015, the mothership fleet generated \$19.1 million in income and supported 461 jobs from purchases of Pacific whiting caught in the catch share program.¹

The domestic Pacific whiting fishery grew rapidly in the 1990s after the United States banned foreign vessels from processing Pacific whiting harvested off the West Coast. With the development of more efficient processes to transform Pacific whiting into surimi (a product popular in Asia), and certification from the Marine Stewardship Council (MSC)² in 2009, demand in the international market continued to rise throughout the 2000s and the Pacific whiting fishery subsequently transformed into one of the largest fisheries by volume in the United States.

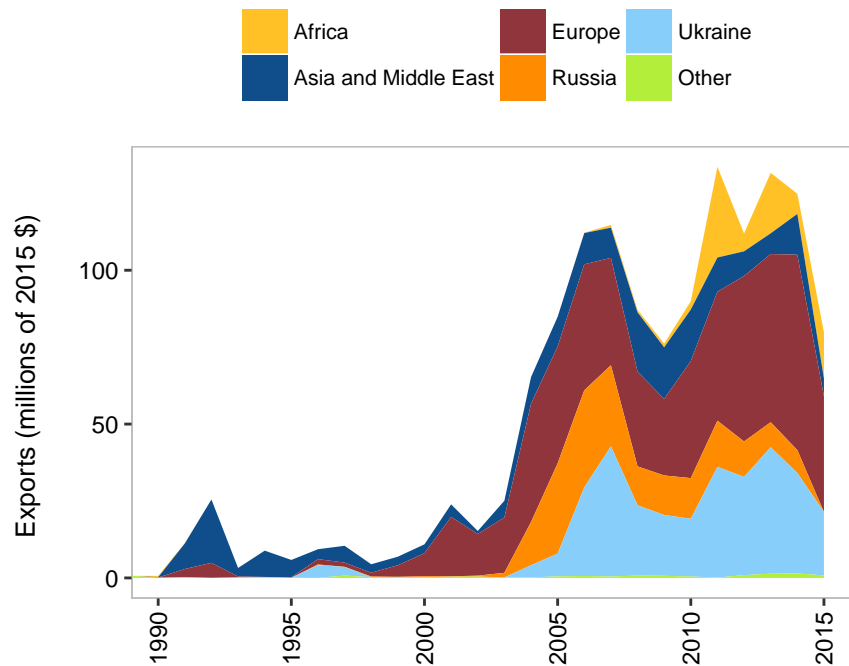


Figure 1: Total exports of fresh and frozen Pacific whiting (including mothership, catcher-processor, and shoreside production) from the U.S. by recipient region (millions of 2015 \$).

¹ Values calculated using the NWFSC IO-PAC model (Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.)

² The MSC certification indicates that the West Coast Pacific whiting fishery has met the standard for “good management practices to safeguard jobs, secure fish stocks for the future and to help to protect the marine environment”. This certification has opened new markets, largely in the European Union, for Pacific whiting.

In 2015, approximately 44,000 metric tons of Pacific whiting worth almost \$80 million were exported from the United States,³ which was comparable to 2009 but lower than recent years (Figure 1). Since 2000, most of these exports went to the European Union, followed by Russia and Ukraine. In September 2014, Russia implemented trade sanctions against Europe and the United States banning imports of many seafood products, which may have led to decreased demand for whiting exports. To date, it is unknown when these sanctions will be lifted.

The PFMC and the National Marine Fisheries Service (NMFS) are responsible for managing the U.S. fishery for the coastal stock of Pacific whiting through a bilateral agreement between the United States and Canada, known as the Pacific Whiting Treaty. The United States and Canada signed an agreement in 2003 (which became law in 2007) that allocates a set percentage of the harvest quota to American and Canadian harvesters. The United States is allocated 73.88% and Canada the remaining 26.12%. Managers use annual harvest quotas to regulate the coast-wide catch of Pacific whiting. Regulations prohibit at-sea processing south of the Oregon-California border.

Once the total allowable catch of Pacific whiting has been determined and the tribal sector's share has been apportioned, the remaining U.S. proportion is then allocated between the catcher-processor, mothership, and shoreside sectors. The mothership sector is allocated 24% while the catcher-processor and shoreside sectors are allocated 34% and 42%, respectively. Near the end of the season, NMFS often redistributes unfished tribal allocations among the three commercial sectors.⁴

Total allowable catch (TAC) has varied substantially during the EDC data collections

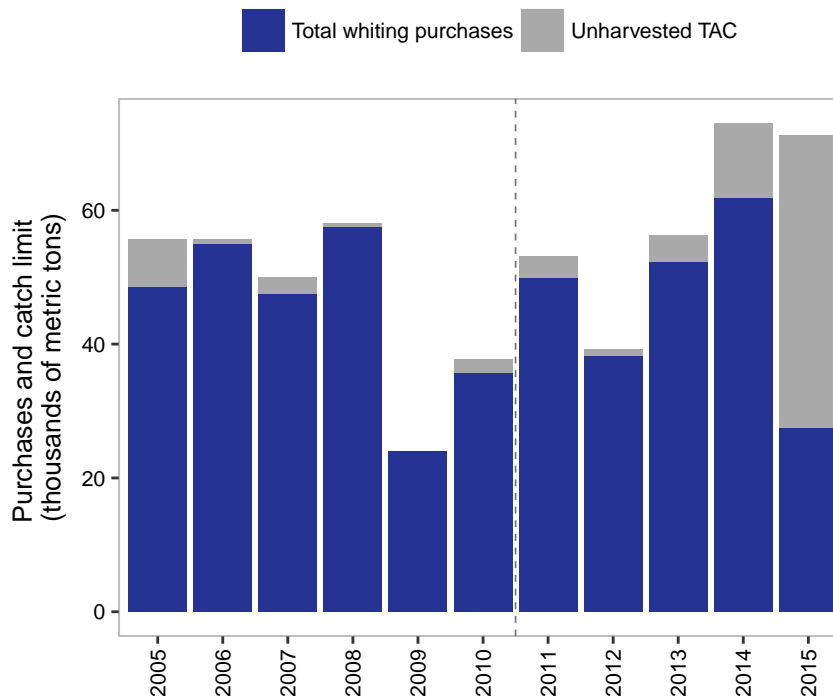


Figure 2: Mothership sector Pacific whiting catch limits, including reapportionments among sectors that may have occurred during the season, and total purchases indicating unharvested portion of allocation (thousands of metric tons). Dashed line represents the beginning of the catch share program.

³ NMFS Science and Technology Commercial Fisheries Statistics, <http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/index>.

⁴ Notably, in 2008, catcher-processors received 6,000 metric tons of surplus mothership Pacific whiting. For allocation and season catch summaries going back through 2005, see http://www.westcoast.fisheries.noaa.gov/fisheries/management/whiting/whiting_reports_and_rulemakings.html.

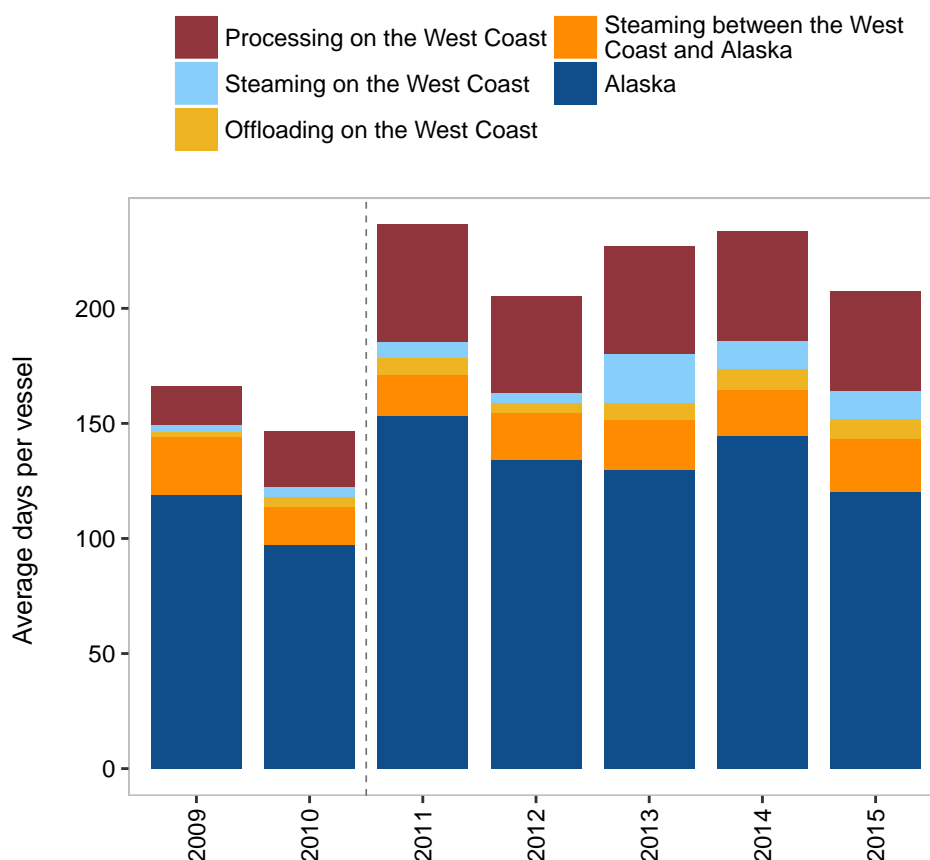


Figure 3: Average number of days spent in each activity per mothership vessel. Dashed line represents the beginning of the catch share program.

from 2009–2015.⁵ After several seasons of large Pacific whiting harvests from 2006–2008, managers lowered the catch limit in 2009, then raised it each year with the exception of 2012 and 2015 (Figure 2). In 2015, the mothership sector received an allocation of 71,200 metric tons of Pacific whiting; about 1,840 metric tons less than the allocation in 2014, but about 15,000 metric tons more than the allocation in 2013 (see Mothership Data Summaries, Table 6.1).

In general, the fleet-wide amount of unharvested sector TAC is driven by a combination of factors including bycatch quota constraints, market demand, ex-vessel prices, participation in non-catch share fisheries, and prevailing ocean conditions that influence the aggregation or “catchability” of target species. From 2005–2014, motherships used at least 85% and an average of 94.5% of their TAC. In 2015, purchases from catcher vessels only amounted to 39% of the sector allocation, largely due to anomalous ocean conditions that began in late 2013 and persisted throughout 2015. In the winter of 2013, a large mass of warm water (known as “The Blob”) formed off the coast of Alaska and had stretched southward along the West Coast by 2015, causing complex, ecosystem-level changes. While the full impacts on Pacific whiting remain unknown, the warm conditions created the lowest recorded biomass of fatty, lipid-rich copepods since 1996,⁶ which could have caused a decline in available groundfish prey species.

⁵ <http://www.pcouncil.org/groundfish/stock-assessments/by-species/pacific-whiting-hake/>.

⁶ NWFSC Annual summary of ocean ecosystem indicators for 2016 and pre-season outlook for 2017. <https://www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/b-latest-updates.cfm>

Initially, strong winds kept these warm waters offshore in the Pacific Northwest, but warmer sea surface temperatures registered on the continental shelf by the fall of 2014. As the anomalies created by The Blob persisted throughout 2015, developing El Niño conditions exacerbated the existing poor foraging situation for upper trophic level species. These conditions likely impacted the timing and availability of fish aggregations for certain target species in the catch share program, and therefore impacted each sector differently depending on their ability to adapt. Therefore, net revenues, fuel costs, time spent steaming, and participation in other fisheries may be different in 2015 compared to other years. On average in 2015, mothership vessels received 9,180 metric tons of Pacific whiting from catcher vessels, representing a 26% decrease from 2014.

In addition to receiving an allocation of Pacific whiting, the mothership sector is also allocated quota for bycatch. In 2015, the mothership sector was allocated 120.0 metric tons of widow rockfish, 10.2 metric tons of Pacific ocean perch (after reallocation), 6.7 metric tons of darkblotched rockfish, and 5.8 metric tons of canary rockfish.⁷ The unharvested allocation of most of these rebuilding species has historically been high, with the fleet receiving deliveries amounting to only 17% of the allocated Pacific ocean perch, 14% of the widow rockfish, 36% of darkblotched rockfish, and less than 3% of allocated canary rockfish in 2015.⁸

In 2015, motherships received about one prohibited or protected fish per every 100 metric tons of Pacific whiting from catcher vessels.⁹ This generally included mostly Chinook salmon, but also chum salmon, coho salmon, Pacific halibut, and eulachon. Major non-prohibited bycatch species include widow rockfish, minor slope rockfish complex species, spiny dogfish, and squid. The bycatch rate in the mothership sector decreased by 23% between the baseline and catch share periods.

NMFS has established mandatory rebuilding plans that limit bycatch for species that are designated “overfished.” Species that remain designated as overfished in 2017 include Pacific ocean perch, darkblotched rockfish, bocaccio, cowcod, and yelloweye rockfish. In 2011, widow rockfish was taken off the overfished list.¹⁰ As a result, the annual catch limit for widow rockfish was raised starting in 2013. Similarly, canary rockfish was taken off the overfished list in 2015,¹¹ and the coast-wide annual catch limit has increased for both widow rockfish and canary rockfish in recent years.

The flexibility introduced by the catch share program allows for the use of new bycatch reduction strategies. Both the catch share provision and the mothership catcher vessels’ cooperative charter state that reducing bycatch is a primary goal under the trawl catch share program. Several measures have been

⁷ Biennial Specifications and Management Measures; Inseason Adjustments, <https://www.gpo.gov/fdsys/pkg/FR-2016-09-01/pdf/2016-21091.pdf>.

⁸ 2015 Pacific whiting fishery summary: http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/groundfish/whiting/2015-summary.pdf.

⁹ 2015 Pacific whiting fishery summary: http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/groundfish/whiting/2015-summary.pdf.

¹⁰ NMFS 2011. Status of the widow rockfish resource in 2011: http://www.pcouncil.org/wp-content/uploads/Widow_2011_Assessment.pdf.

¹¹ NMFS 2015. Status of canary rockfish in the CA current in 2015: http://www.pcouncil.org/wp-content/uploads/2015/05/D8_Att1_Canary_2015_FULL-E-Only_JUN2015BB.pdf.

voluntarily agreed upon by the catcher vessel cooperative members, including the designation of bycatch “hotspots” and a prohibition on night fishing that is broader than what is required by regulation.

Mothership Sector Description

In 2015, four different companies owned the seven vessels with active permits in the West Coast mothership sector, and of these, three motherships participated in the fishery. These motherships process Pacific whiting (*Merluccius productus*), also known as Pacific hake, on the West Coast. Motherships are large vessels, with those participating on the West Coast in 2015 being approximately 314 feet long with a fuel capacity of about 287,000 gallons.

In 2015, the mothership fleet purchased approximately 8% of all commercially harvested fish on the West Coast (including crab and shrimp), 18% of Pacific whiting, and 16% of all catch share species harvest weight.

Two types of vessels participate in the Pacific whiting mothership sector: traditional motherships that also act as a mothership in Alaska, and catcher-processor vessels that only act as a mothership on the West Coast. Both types of vessels spend the majority of their time in the Alaska pollock fishery in the Bering Sea and Aleutian Islands (Figure 3). Changes in Alaska operations likely reflect changes in regulations and annual catch limits in the Alaska pollock fishery, along with the shift to catch shares on the West Coast.

In 2015, mothership vessels spent the majority of their time (58%) processing Alaska pollock in the Bering Sea and Aleutian Islands off Alaska, otherwise they were operating on the West Coast or steaming between the West Coast and Alaska. In 2015, the average mothership spent 55 days processing fish and steaming along the West Coast and 23 days steaming between the West Coast and Alaska (See Mothership Data Summaries, Table 2.1 for more information on fleet activity). The fleet as a whole took 12 one-way trips to and from Alaska in 2015. West Coast motherships deliver Pacific whiting

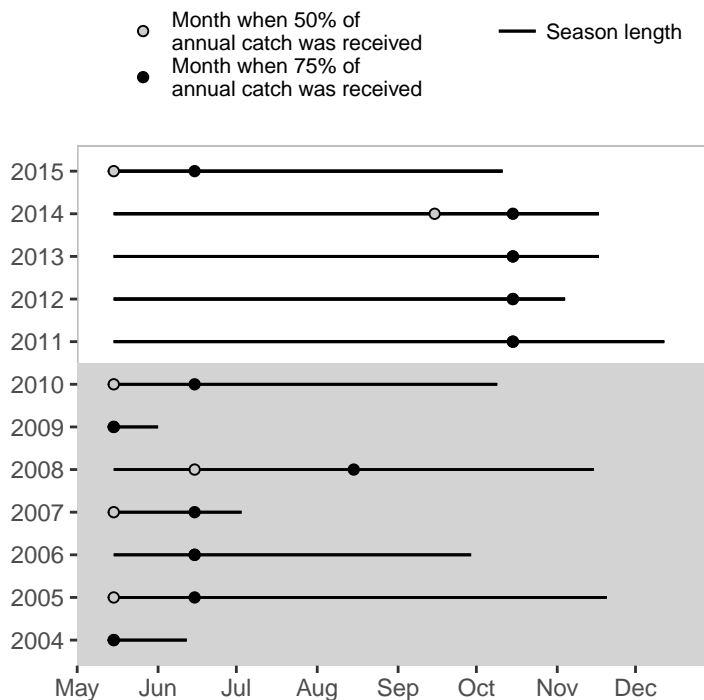


Figure 4: Season length for the mothership whiting fishery, with horizontal lines representing when the first and last whiting was received. The open and closed circles represent the month when 50% and 75% of the annual catch was received, respectively. The shaded region represents the period prior to the implementation of catch shares.

primarily to two ports in Washington state: Blaine/Bellingham and Seattle. All of the motherships that participated in the West Coast whiting fishery list Seattle as their home port.

Companies managing mothership vessels must balance several factors when deciding when and where to operate throughout the year, including fish prices, bycatch quota attainment, and opportunities to participate in other fisheries. In 2009 before the implementation of the catch share program, the Council recommended sector-specific bycatch quota allocations for the at-sea sectors, which resolved competition for constraining bycatch species catches. This improved operational flexibility, particularly for the mothership sector that was not already operating under a cooperative. The catch share program provides increased operational flexibility to both motherships and catcher vessels, demonstrated through changes in season length (Figure 4). The length of the season (the number of days from the first to the last haul) fluctuated during the years before catch shares, often relative to changes in the catch limit. Under current regulations, motherships can begin processing at sea on May 15. The mothership fleet had processed at least half of their annual quota by the end of May for five out of the seven years leading up to the implementation of catch shares. By comparison, with the exception of 2015, processing continued into October in years after the implementation of catch shares (Figure 4), indicating that the cooperative framework may provide more operational flexibility.

Economic Indicators

The EDC Program tracks economic indicators by compiling information submitted by participants about expenses and revenue and how those figures change over time. All values reported here in the Overview section are inflation-adjusted 2015 dollars. Pre-catch share data for the 2009 and 2010 operating years were submitted in 2011 and have been averaged to calculate “baseline” conditions within the fishery to which subsequent years of data can be compared. Despite having had historically low TAC in 2009 and 2010, these years are used as the baseline due to the burden on participants of requesting additional years of data.

Variable Costs

Mothership vessel costs are separated into two categories: variable costs and fixed costs. Variable costs are the majority of a vessel's total expenditures and include fish purchases, fuel, crew compensation, food, additives, packaging and materials, and observer coverage. Variable costs vary with the level of fishery participation, and were lowest in 2009 (\$2.05 million), highest in 2014 (\$6.65 million), and amounted to \$5.11 million per vessel in 2015 (see Mothership Data Summaries, Table 8.1).

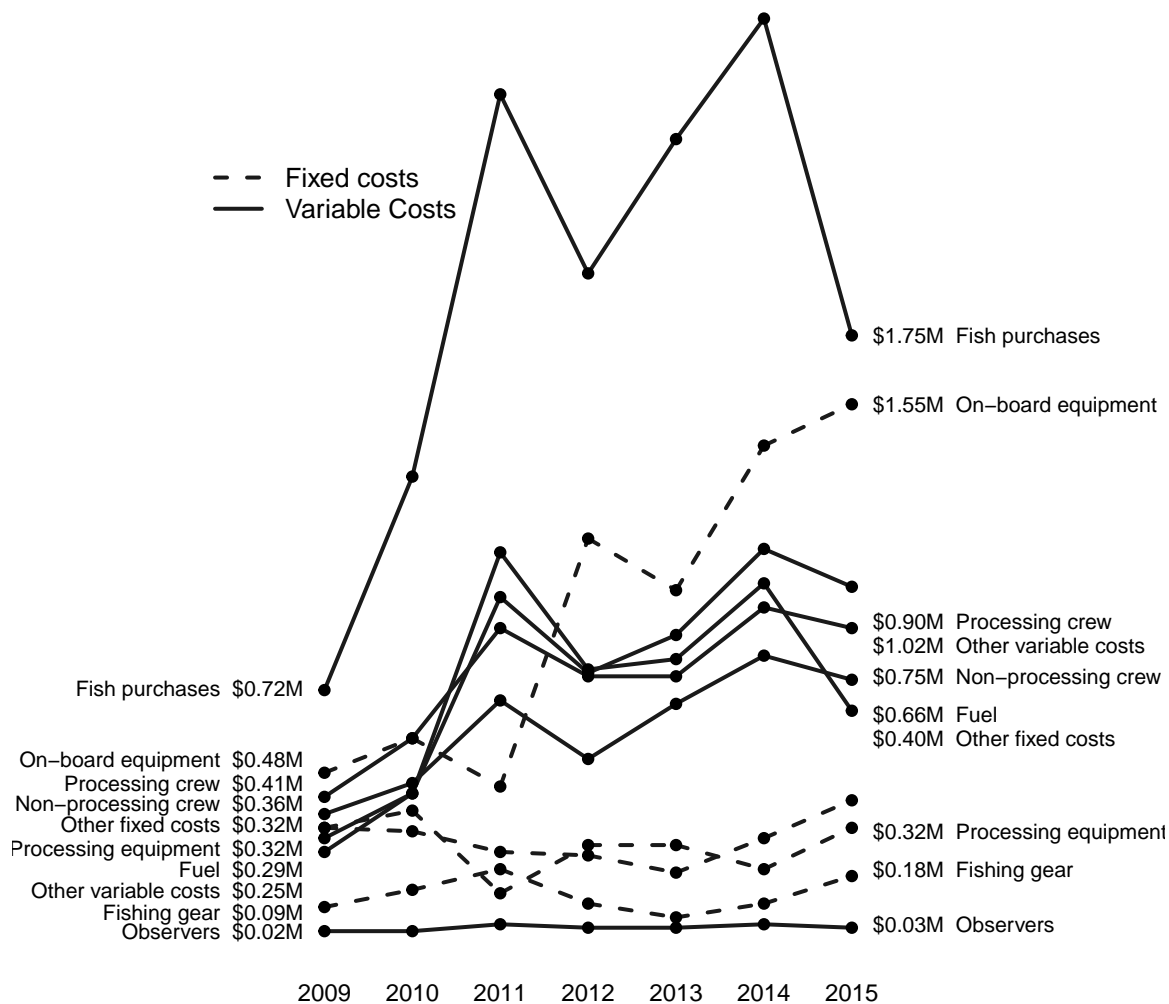


Figure 5: Average fixed (dashed line) and variable costs (solid line) per vessel (millions of 2015 \$).

Pacific whiting purchases constituted the largest portion of variable costs (\$1.75 million), followed by processing crew compensation (\$898,000) and non-processing crew compensation (\$754,000). Overall expenditures on fish purchases increased substantially from 2009-2014 (reflecting changes in total allowable catch) and declined in 2015 due to low catch attainment (Figures 2 and 5). The fleet's average price paid per metric ton of fish purchased from catcher vessels has ranged from \$200 during the pre-catch share period to a peak of \$255 in 2012, decreasing to \$191 in 2015.

Crewmembers include line workers, fishmeal crew, quality control, technicians, cleanup, factory managers, combis, and mechanics who work on processing equipment. During the baseline years, motherships employed an average of 88 processing crew and 34 non-processing crew, which changed to 80 and 28 by 2015, respectively. Processing crewmember compensation was lowest in 2009 (\$4,600), highest in 2011 (\$14,400), and amounted to \$11,400 in 2015 for an overall 93% increase from the baseline period. Likewise, annual compensation per non-processing crewmember was lowest in 2009 (\$9,870) and highest in 2015 (\$27,700), representing a 139% increase compared to baseline conditions.

Average daily fuel use across all activities (processing and steaming on the West Coast and in Alaska) was 5,690 gallons per day in 2015, decreasing by 12% from baseline conditions. Fuel and lubrication constitute one of the largest cost categories for the fleet on the West Coast, with total costs varying with fuel prices. The Pacific States Marine Fisheries Commission tracks historical marine fuel prices, which in Washington state have ranged from \$1.92 in 2009 to a high of \$4.10 per gallon in 2012, remaining less than \$3.00 throughout 2015.¹² Average fuel expenses reported by motherships on the West Coast have increased by 2 fold compared to baseline conditions.

Observer coverage on motherships dates back to the MSA, first passed in

1976. Mothership vessels, like the rest of the processing fleet, have continued to have observers on board while operating in the West Coast Pacific whiting fishery after the implementation of the catch share program. The average cost of observer coverage for motherships was highest in 2011 (\$39,100 per vessel) and cost \$32,200 in 2015.

The MSA requires that NMFS compute and collect cost recovery fees from participants of limited access privilege programs, such as catch shares, to recover additional government costs attributable to the private sector use of a public resource. Cost recovery fees were implemented for the West Coast groundfish fishery in 2014 and are calculated yearly, not to exceed 3% of ex-vessel value. Unlike catcher-processors, fees for the mothership sector are paid by catcher vessels that deliver the fish.¹³

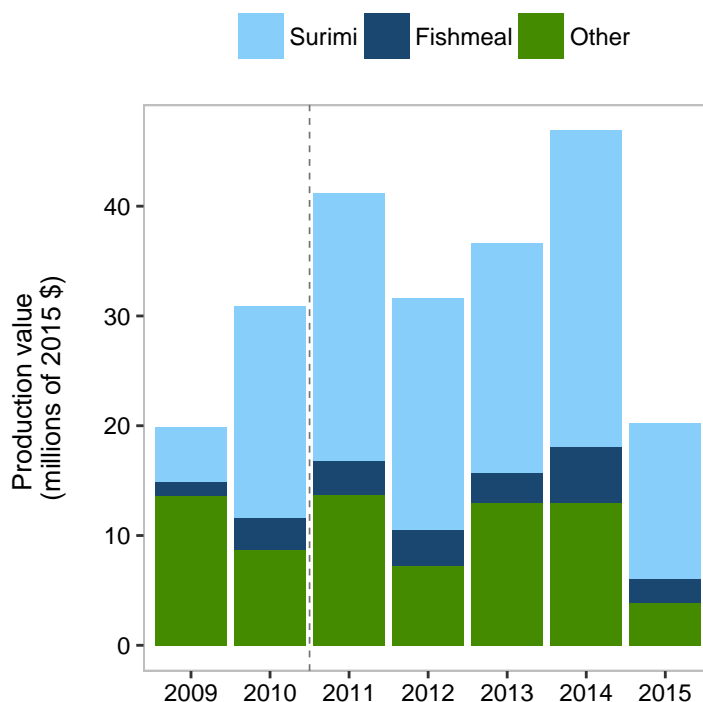


Figure 6: Fleet-wide production value by product type (millions of 2015 \$). Other includes fillets, fish oil, headed and gutted, minced, and round, and are combined to protect confidential data. Dashed line represents the beginning of the catch share program.

¹² PSMFC 2015. West Coast and AK Marine Fuel Prices Annual Report, <http://www.psmfc.org/efin/docs/2015FuelPriceReport.pdf>.

¹³ For more information on cost recovery fees, see the Compliance Guide at http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/groundfish/public_notices/cost-recovery-compliance-guide.pdf.

Fixed Costs

Fixed costs include capitalized expenditures and expenses on vessel and on-board equipment, fishing gear for catcher vessels, and processing equipment. In general, these do not vary with fishing effort as much as variable costs. Average annual expenditures on vessel and on-board equipment, fishing gear, and processing equipment were highest in 2012 and 2014 and have averaged \$669,000 since 2009. In 2015, the average West Coast portion of other fixed costs amounted to \$397,000, similar to baseline conditions.

Revenue

Earnings sources on the EDC survey form include the total value received for processed product, sale or lease of mothership-endorsed permits, chartering, and insurance settlements, though participants have only reported fish production revenue to date. Total and average production values are summarized by product type, per vessel, per day, and per metric ton produced (See Data Summaries Tables 7.2, 11.1, 11.2, and 11.2 for more detailed information).

The average production value of all Pacific whiting products was about \$6.76 million per vessel (representing a 60% increase from baseline conditions) and \$2,410 per metric ton in 2015. Surimi, with an average production value of \$2,630 per metric ton, comprised the largest portion of production revenue (Figure 6) and production weight (Figure 7). Fishmeal had an average production value of \$2,000 per metric ton in 2015, representing 4% growth compared to baseline conditions (Figure 8). The “Other” category includes fillets, fish oil, fish sold in the round, or headed and gutted fish, and fluctuates in volume and value from year to year (Figures 6 and 7).

The product markup (total production value divided by total fish purchase costs) decreased from 4.57 to 3.86 during 2009–2015 as the average production value remained constant but purchase prices increased. The product recovery rate (total production weight divided by total fish purchase weight) was 0.31 in 2015, ranging from 0.27 to 0.50 since 2009.

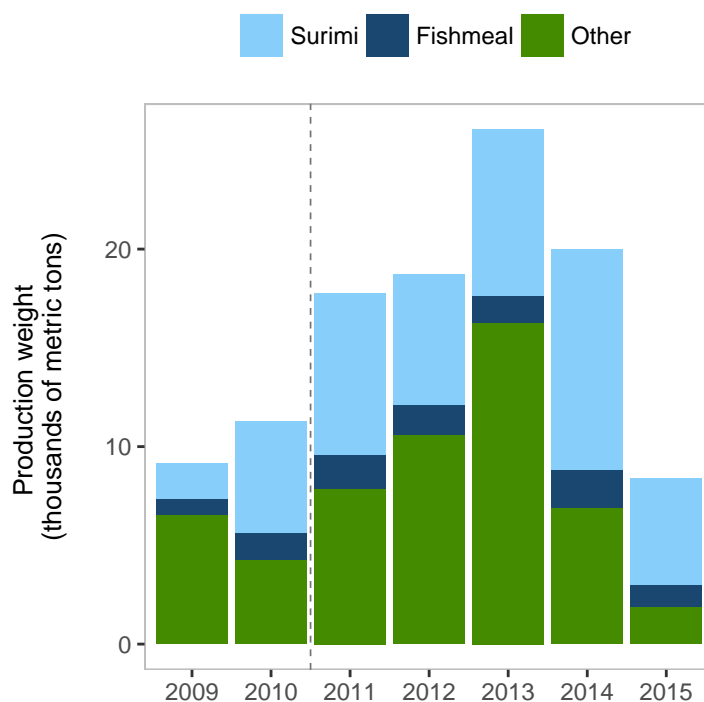


Figure 7: Fleet-wide production weight by product type (thousands of metric tons). Other includes fillets, fish oil, headed and gutted, minced, and round, and are combined to protect confidential data. Dashed line represents the beginning of the catch share program.

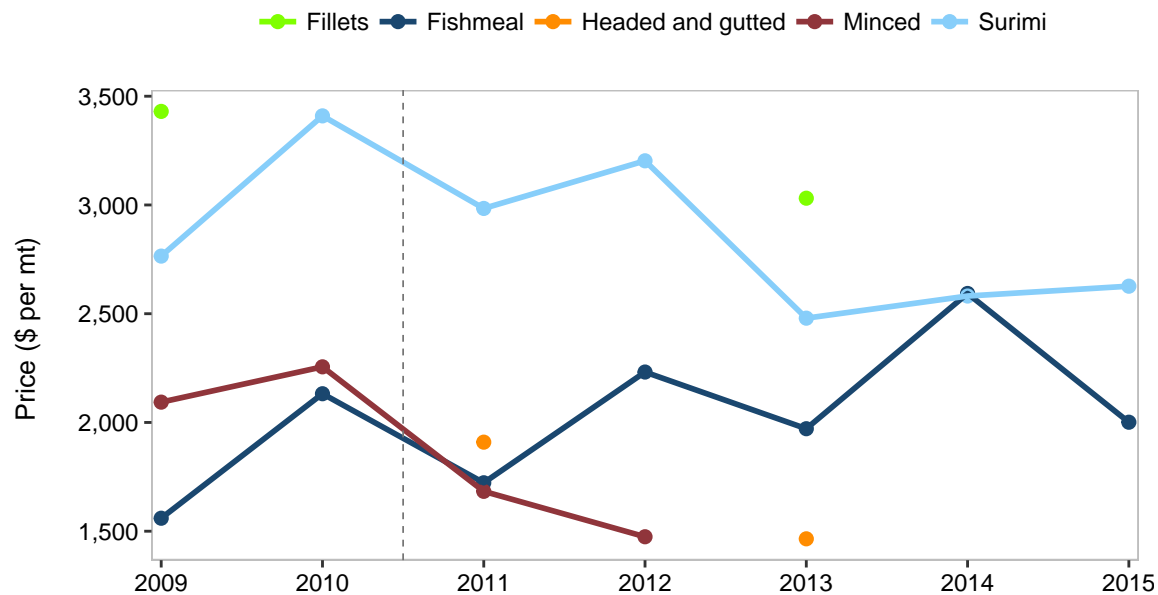


Figure 8: Average price by product type (2015 \$). Some values are suppressed to protect confidential information. Product types such as minced, fillets, and fish oil delineated here were combined in Figures 6 and 7. Dashed line represents the beginning of the catch share program.

Net Revenue

The EDC Program measures the net economic benefits of the catch share program by reporting two types of net revenue. The first is variable cost net revenue, which is revenue minus variable costs. The second is total cost net revenue, which is revenue minus both variable and fixed costs.¹⁴ To provide a complete picture of the changes that have occurred, net revenue is presented at two scales. Figure 9 shows the total fleet-wide net revenue for the fishery, while Figure 10 shows net revenue for the average vessel. Both figures only include revenues and costs associated with the West Coast catch share program. It is important to note that the EDC forms aim to capture only costs that are directly related to vessel fishing operations, and not costs that are related to activities or equipment off the vessel. Therefore, the net revenue reported here is an overestimate of the true net revenue.¹⁵

In 2015, motherships generated a total fleet-wide revenue of \$20.3 million and spent about \$22.7 million in fixed and variable costs, leading to a total cost net revenue (revenue minus all costs) of approximately -\$2.41 million for the year (Figure 9). From baseline conditions in 2009 and 2010, the fleet has experienced increasing revenue and variable costs, with costs being highest in 2011 and 2014. Revenue had kept pace with these increasing costs through 2014, but the lower revenue in 2015 (due to low catch attainment) did not offset the year's costs. Total cost net revenue decreased by 167% from 2014 to 2015.

In terms of revenue per vessel, motherships generated an average revenue of \$6.76 million and spent

¹⁴ See Figure 5 for a description of which costs are considered variable costs and which costs are considered fixed costs.

¹⁵ See Mothership Data Summaries Section 8: Costs and Section 10: Net Revenue and Economic Profit for a more complete discussion of variable costs, fixed costs, and the calculation of net revenue.

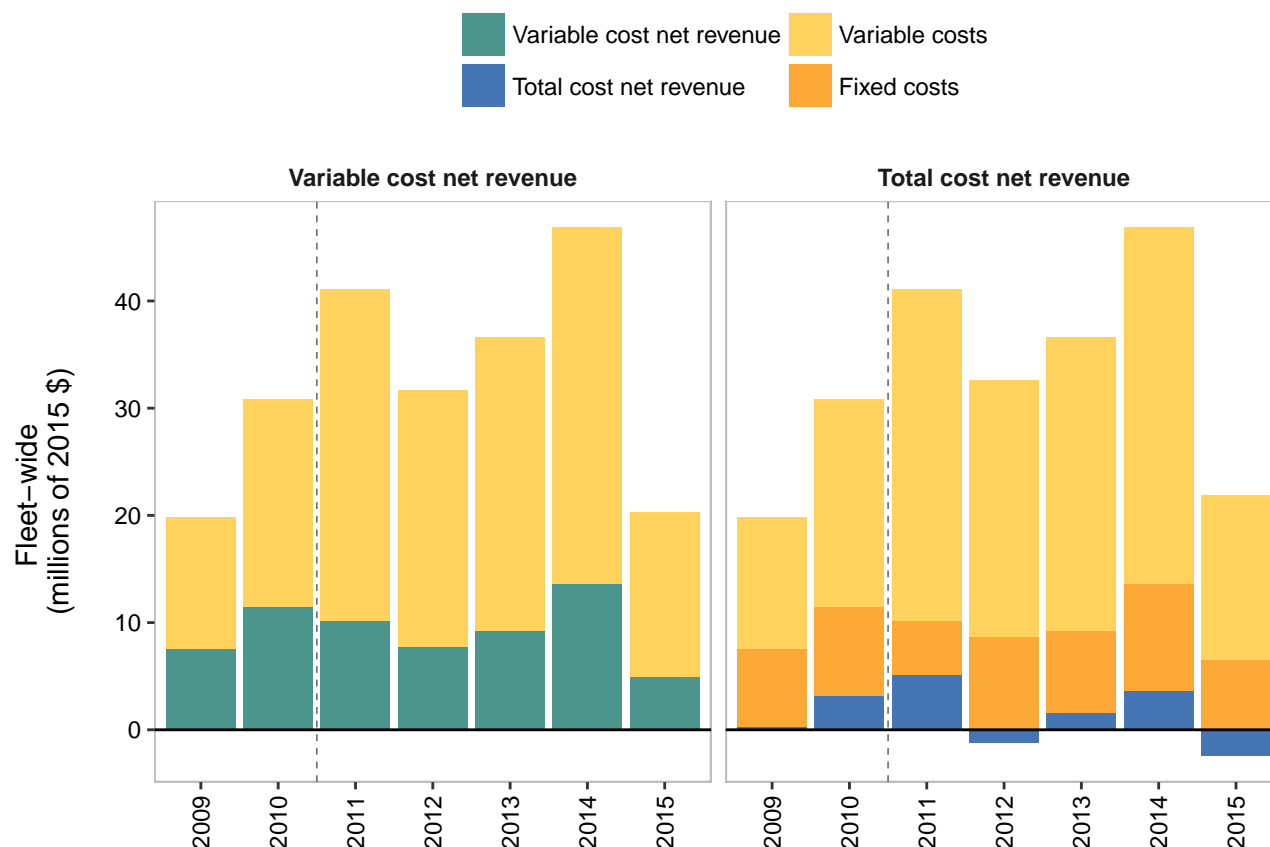


Figure 9: Fleet-wide variable cost net revenue (revenue minus variable costs) (left) and fleet-wide total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of 2015 \$). Dashed line represents the beginning of the catch share program.

about \$7.56 million in fixed and variable costs, leading to a total cost net revenue of approximately -\$803,000 per vessel for the year (Figure 10), representing a 211% decrease from 2014.

Many of the above patterns in costs and revenue are also evident in daily and production value rates. Daily production value per vessel was \$122,000 in 2015. Motherships earned a variable cost net revenue per metric ton produced of \$620 in 2015, a 2% increase from 2014 (see Mothership Data Summaries, Table 11.2).

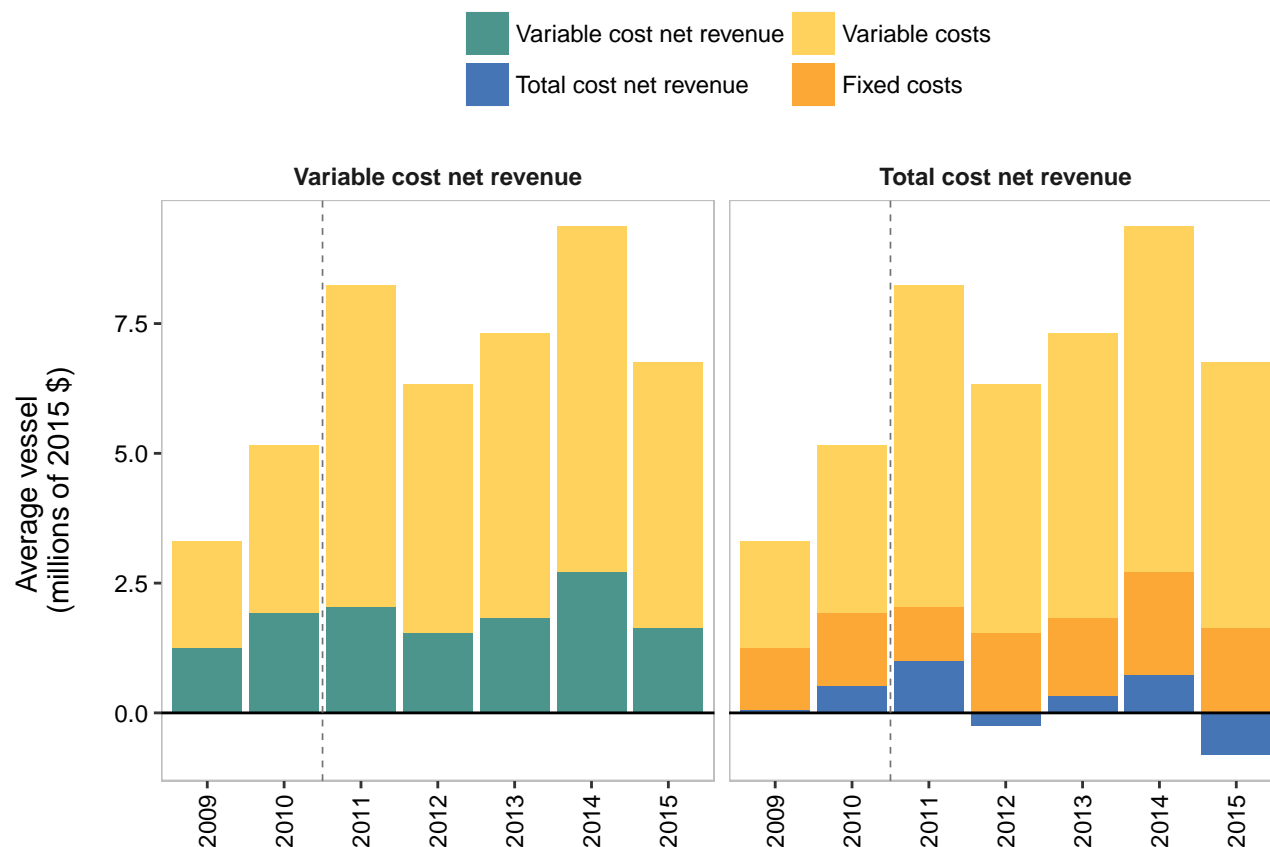


Figure 10: Average variable cost net revenue (revenue minus variable costs) (left) and average total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of 2015 \$). Dashed line represents the beginning of the catch share program.

Mothership Report

MOTHERSHIP REPORT

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Mothership Data Summaries

1 Introduction

1.1 Background

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and comprises over 90 different species of fish. Fish are harvested both commercially and recreationally. The commercial fishery has four components: limited entry with a trawl endorsement, limited entry with a fixed gear endorsement, open access, and tribal. In January 2011, the West Coast Limited Entry Groundfish Trawl fishery transitioned to the West Coast Groundfish Trawl Catch Share Program. The catch share program consists of cooperatives for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet.¹

The Economic Data Collection (EDC) program² was implemented as part of new regulations to monitor the economic effects of the catch share program. Annual economic data submissions are required from all fishery participants: catcher vessels, motherships, catcher-processors, and first receivers and shorebased processors §50 CFR 660.114. Baseline, pre-catch share data were submitted in 2011 for the 2009 and 2010 operating years, and data for each annual report update were collected in the following calendar year (e.g., the most recent 2015 data submitted for this updated report were collected in 2016).

The EDC Program has enhanced the quantity and quality of economic information available for analysis, and for the management of the West Coast groundfish trawl fishery. While costs and earnings data are available for shorebased catcher vessels starting in 2004,³ this is the first data collection series for the mothership fleet. This report summarizes the 2009-2015 EDC mothership survey data, and with its

¹ Information about the Catch Share Program is available at <http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish.catch.shares/>.

² Additional information on the EDC Program, including the EDC data collection forms can be found at <http://www.nwfsc.noaa.gov/edc>.

³ Lian, C.E. 2010. West Coast limited entry groundfish trawl cost earnings survey protocols and results for 2004. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-107, 35 p.

companion reports covering the other sectors, is the fourth in the series of reports. The scope of these reports continues to expand and the methods are refined with each publication.

1.2 Understanding the report

The data provided in the summary tables throughout the report are for all vessels that fished on the West Coast during the survey year, unless otherwise noted. Unlike the Overview section, all numbers reported in the Data Summaries are generated from the raw responses received from participants and, therefore, are in nominal dollars.

All data submitted via the EDC Program are confidential under 402(b) of the Magnuson-Stevens Act (16 U.S.C. 1801, et seq.) and under NOAA Administrative Order 216-100.⁴ In order to protect these data, a rule of three and a rule of 90-10 are implemented. The rule of three requires a response from at least three companies in order to show a summary statistic. The 90-10 rule requires that no single company's value comprise over 90 percent of the value displayed. In the case of the West Coast whiting mothership fishery, there are only four companies. The tables show a '***' for data points where there are less than three companies reporting the information, and/or where one company's responses account for greater than 90 percent of the average value. Zeroes are shown if all entities report zeroes. More information about how confidential data are protected in the EDC Program can be found in the Administration and Operations Report. Simple means are reported for statistics that denote the performance of an average entity (*i.e.*, net revenue) while weighted means are reported for statistics that describe characteristics of the fishery (*i.e.*, ex-vessel prices, markup, recovery rates, etc.). Additionally, "—" is used to denote fields where the question was not asked on the form in that survey year.

In order to track and assess the variation of data submitted by participants across any given variable or statistic, these reports include the coefficient of variation (CV) of the mean. The stacked dots included in the data tables provide information about the coefficient of variation (CV) of the mean. We use the following scoring:

- represents $CV < 0.5$,
- represents $0.5 \leq CV < 1.0$,
- represents $1.0 \leq CV < 2.0$, and
- represents $2.0 \leq CV$. For 2009-2015, none of the CVs exceeded 2.83.

Although participants are identified on a calendar year basis, survey forms are completed using information based on their fiscal year. The fiscal year can span more than one calendar year, but, to date, there is no vessel where the fiscal year spans more than one whiting season.

The EDC survey form has not changed significantly since the baseline 2009-2010 data collection. One change to the forms from 2009-2010 to the present pertained to offload locations, with "Tacoma" substituted for "Westport, Hoquiam" in response to input on the 2009 and 2010 surveys. In 2012, a

⁴ For more information about form administration, please see Administration and Operations Report.

space was added for participants to provide the total round weight harvested in the West Coast fisheries in addition to that harvested in Alaska/Other, in order to validate the external data source that was used to calculate revenue from West Coast whiting. In 2013, a new question was added, “Provide the total number of individuals who worked for you”. Respondents provide the total number of processing crew and the total number of non-processing crew, creating an upper bound of the total number of people employed by the sector.

1.3 Purpose of the report

This report, like the other four EDC reports,⁵ has multiple objectives. The first is to provide basic economic data summaries that can be used for a variety of purposes associated with fishery management. Since much of the data collected are confidential under the 2007 reauthorization of the MSA, the data are summarized as averages or totals. Thus summarized, the reports make the data available to the public for both research and informational purposes.

Second, the reports provide information that can be used to examine the performance of the catch share program in terms of whether and to what degree the goals of the program are being met. It is expected that additional modeling will provide increased detail about program impacts. These reports and underlying data and analyses are the basis for the 5-year review of the catch share program that is mandated by the MSA, as well as the NMFS National Catch Shares Performance Indicators.

Third, the reports serve as the basis for economic models that are used as part of the PFMC’s biennial specification process for groundfish management. These models include the IO-PAC model,⁶ as well as estimates of revenue, costs, and net revenue.

Lastly, and perhaps most importantly, the reports are expected to serve as a catalyst for feedback on the data and their analysis.

1.4 Mothership form administration

Completion of EDC forms is mandatory for participants in the catch share program. Survey participants are identified using contact information provided by the Northwest Regional Permit Office. The regulations for defining who is required to complete an EDC form differs between the baseline data collection

⁵ In addition to the mothership report, there are four companion reports:

- Economic Data Collection Program, Administration and Operations Report (May 2016)
- Economic Data Collection Program, Catcher-Processor Report 2009-2015 (June 2017)
- Economic Data Collection Program, Catcher Vessel Report 2009-2015 (June 2017)
- Economic Data Collection Program, First Receiver and Shorebased Processor Report 2009-2015 (June 2017)

⁶ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

(2009 and 2010) and all annual/ongoing data collections for 2011 onward. For the baseline period, all owners, lessees, and charterers of a mothership vessel that received whiting in 2009 or 2010 as recorded in NMFS' NORPAC database §660.114(b)(3)(i) were required to complete an EDC form. For 2011 and beyond, all owners, lessees, and charterers of a mothership vessel registered to a mothership permit at any time are required to complete an EDC form §660.114(b)(3)(ii). For permit owners, a mothership permit application will not be considered complete until the required EDC form for that permit owner is submitted, as specified at §660.25(b)(4)(i). For a vessel owner, participation in the groundfish fishery (including, but not limited to, changes in vessel registration) will not be authorized until the required EDC form for that owner for that vessel is submitted, as specified, in part, at §660.25(b)(4)(v). For a vessel lessee or charterer, participation in the groundfish fishery will not be authorized until the required EDC form for their operation of that vessel is submitted.

A calendar year is used to determine which vessels meet the criteria. For example, in 2016, data were collected from all owners, lessees, and charters of a mothership registered to a limited entry trawl permit during 2015. The forms are fielded on this schedule in order to allow participants the time necessary to complete their taxes, which may contain information required on the EDC forms.

If a form has missing information, or the information provided on the form is believed to be incorrect, EDC Program staff attempt to contact the participant to correct the information. On occasion, the participant cannot be reached or the participant cannot provide the missing information. In these cases, the missing or inaccurate data are treated on a case-by-case basis during analysis as documented in the Administration and Operations Report. Data are validated and verified with external data sources whenever possible. These data sources include the Northwest Regional Permit Office and the At-Sea Hake Observer (A-SHOP) program.

2 Vessel Participation on the West Coast and in Alaska

The mothership fleet participates in fisheries on the West Coast and Alaska. Table 2.1 provides the average days at sea by activity listed. Participants are instructed to count partial days as full days when recording days at sea on the forms. Table 2.2 presents the average number of one-way trips vessels made steaming between Alaska and the West Coast that year. Table 2.3 presents the number of vessels that processed fish within the catch share program on the West Coast and Alaska.

Table 2.1: Average days at sea. Average days at sea by activity on the West Coast and in Alaska for mothership vessels (N = number of vessels with non-zero, non-NA responses).

Description	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Processing on the West Coast	17	6	24	6	51	5	42	5	47	5	47	5	43	3
Offloading on the West Coast	2	6	4	6	7	5	5	5	7	5	9	5	9	3
Steaming on the West Coast	3	6	4	6	7	5	4	5	21	5	12	5	12	3
Steaming between West Coast and Alaska	25	6	20	5	18	5	20	5	22	5	20	5	23	3
Operating in Alaska	119	6	117	5	153	5	134	5	130	5	145	5	120	3

Table 2.2: Average number of trips to Alaska. Mean number of one-way trips between the West Coast and Alaska (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
One-way trips to Alaska	3.7	6	3.6	5	4.0	5	3.6	5	3.6	5	4.0	5	4.0	3

Table 2.3: Number of vessels that processed fish on the West Coast and in Alaska. Number of vessels that processed fish on the West Coast and in Alaska since the beginning of data collection.

Location	2009	2010	2011	2012	2013	2014	2015
Alaska	6	5	5	5	5	5	3
West Coast	6	6	5	5	5	5	3

3 Delivery Locations

Participants report the percentage of all West Coast whiting products offloaded from the mothership vessel at each major West Coast port. Table 3.1 lists the number of vessels delivering to each location. Some vessels delivered to more than one location in a given year.

Table 3.1: Delivery locations. Total number of vessels that offloaded in each location. Some vessels delivered to multiple locations in the same year.

Location	2009	2010	2011	2012	2013	2014	2015
Astoria	0	0	1	0	0	0	0
Blaine/Bellingham	1	3	3	3	3	1	1
Coos Bay	0	0	0	0	0	0	0
Port Angeles	0	0	0	0	0	0	0
Seattle	5	5	2	2	3	4	2
Tacoma	—	0	0	0	0	0	0
At-sea	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0

4 Vessel Physical Characteristics

Survey participants provide basic information about the vessel and its physical characteristics, including market value, replacement value, vessel length, horsepower of main engines, and fuel capacity from the most recent marine survey (Table 4.1). Marine surveys are done on a regular basis and are often required for insurance, financing, and other purposes.

Table 4.1: Vessel characteristics. Average market value (millions of \$), replacement value (millions of \$), vessel length (feet), horsepower of main engines (thousands), and fuel capacity (thousands of gallons) (N = number of EDC vessels with non-zero, non-NA responses).

Vessel characteristic	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Market value	54.5 ⁺	4	54.5 ⁺	4	42.8 ⁺	4	46.0 ⁺	4	46.0 ⁺	4	56.5 ⁺	4	***	***
Replacement value	107.5 ⁺	4	107.5 ⁺	4	86.2 ⁺	4	87.5 ⁺	4	100.0 ⁺	4	122.0 ⁺	4	***	***
Vessel length	360 ⁺	6	360 ⁺	6	304 ⁺	5	304 ⁺	5	304 ⁺	5	372 ⁺	5	314 ⁺	3
Horsepower	8.5 ⁺	6	8.5 ⁺	6	5.2 ⁺	5	5.2 ⁺	5	4.8 ⁺	5	8.7 ⁺	5	5.4 ⁺	3
Fuel capacity	397.7 ⁺	6	397.7 ⁺	6	247.3 ⁺	5	243.7 ⁺	5	243.7 ⁺	5	437.1 ⁺	5	287.0 ⁺	3

Participants also provide information about whether the vessel was hauled out at any point during the year, which provides context that may be used to explain major costs associated with vessel repair and maintenance. Since 2009, a large proportion of all active fishing vessels have been hauled out in a given year (Table 4.2).

Table 4.2: Number of vessels hauled out. Number (N) and percentage (%) of vessels that were hauled out during the year.

Haul out	2009		2010		2011		2012		2013		2014		2015	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	3	50%	1	17%	2	29%	3	43%	3	50%	2	33%	4	67%
No	3	50%	5	83%	5	71%	4	57%	3	50%	4	67%	2	33%

5 Vessel Fuel Use and Crew Size

5.1 Fuel use

Participants provide information about average fuel use per day and total fuel use per year when engaged in fishing activities on the West Coast (Tables 5.1 and 5.2). The total annual fuel usage by vessels during the survey year in the West Coast whiting fishery excludes fuel used for steaming between the West Coast and Alaska.

Table 5.1: Average daily fuel use. Average daily fuel use (thousands of gallons) while steaming and processing in the West Coast whiting fishery and steaming between the West Coast and Alaska (N = number of vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Processing and steaming on West Coast	6.5 [*]	6	6.5 [*]	6	5.1 [*]	5	5.9 [*]	5	5.5 [*]	5	6.2 [*]	5	5.7 [*]	3
Steaming between West Coast and Alaska	6.7 [*]	6	6.5 [*]	6	3.8 [*]	5	5.0 [*]	5	4.9 [*]	5	6.5 [*]	5	4.8 [*]	3

Table 5.2: Annual fuel use. Average total fuel use (thousands of gallons) (N = number of vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Total bunker fuel	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Total diesel	118 [*]	6	136 [*]	6	279 [*]	5	217 [*]	5	212 [*]	5	262 [*]	5	250 [*]	3
Total fish oil	***	***	***	***	***	***	***	***	***	***	***	***	***	***

5.2 Crew size

Participants provide the number of processing and non-processing crewmembers on board at any one time when the vessel was operating in the West Coast whiting fishery during the year (Table 5.3). In 2013, the EDC form was revised to also collect information on the total number of individuals employed annually (Table 5.4). The total number of individuals employed across all vessels serves as an upper bound of the total number of individuals employed in the fishery. Processing crew includes line workers, fishmeal crew, quality control, technicians, cleanup, factory managers, combis, and mechanics who work on processing equipment. Non-processing crew includes the captain, deckhands, wheelhouse, galley, and engineers.

Table 5.3: Average crew size. Average number of non-processing and processing crew positions per vessel (N = number of EDC vessels with non-zero, non-NA responses).

Crew Type	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Non-processing	35.2	6	33.0	6	34.0	5	32.2	5	31.2	5	45.4	5	27.7	3
Processing	90.3	6	85.2	6	66.0	5	71.8	5	68.6	5	83.0	5	80.0	3

Table 5.4: Average number of individuals employed. Average total number of individuals employed in non-processing and processing crew positions throughout the year (N = number of EDC vessels with non-zero, non-NA responses).

Crew Type	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Non-processing crew	—	—	—	—	—	—	—	—	34.4	5	53.0	5	30.3	3
Processing crew	—	—	—	—	—	—	—	—	85.8	5	113.0	5	89.0	3

6 West Coast and Alaska Round Weight

To document and track the volume of fish harvested and purchased during the year, participants are asked to provide the total round weight of all fish processed on the vessel in all fisheries, including the West Coast and Alaska. This information is then combined with the annual whiting fish purchases on the West Coast provided by the A-SHOP through the Pacific Fisheries Information Network (PacFIN) database (Table 6.1).

Table 6.1: Mothership sector allocation, West Coast whiting purchases, and total purchases. Final whiting allocation for the West Coast mothership whiting sector, total West Coast whiting purchases (excluding tribal purchases), and total weight of all purchases (West Coast, Alaska, and tribal) (thousands of metric tons) (N = number of vessels with non-zero, non-NA responses).

Description	2009		2010		2011		2012		2013		2014		2015	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
WC Whiting allocation	24.0		37.7		53.0		39.2		56.2		73.0		71.2	
West Coast whiting purchases	23.5	6	41.8	6	52.7	5	37.5	5	52.1	5	61.5	5	27.5	3
West Coast and Alaska harvest and purchases	203.5	6	212.6	6	166.1	5	187.7	5	171.2	5	243.3	5	136.0	3

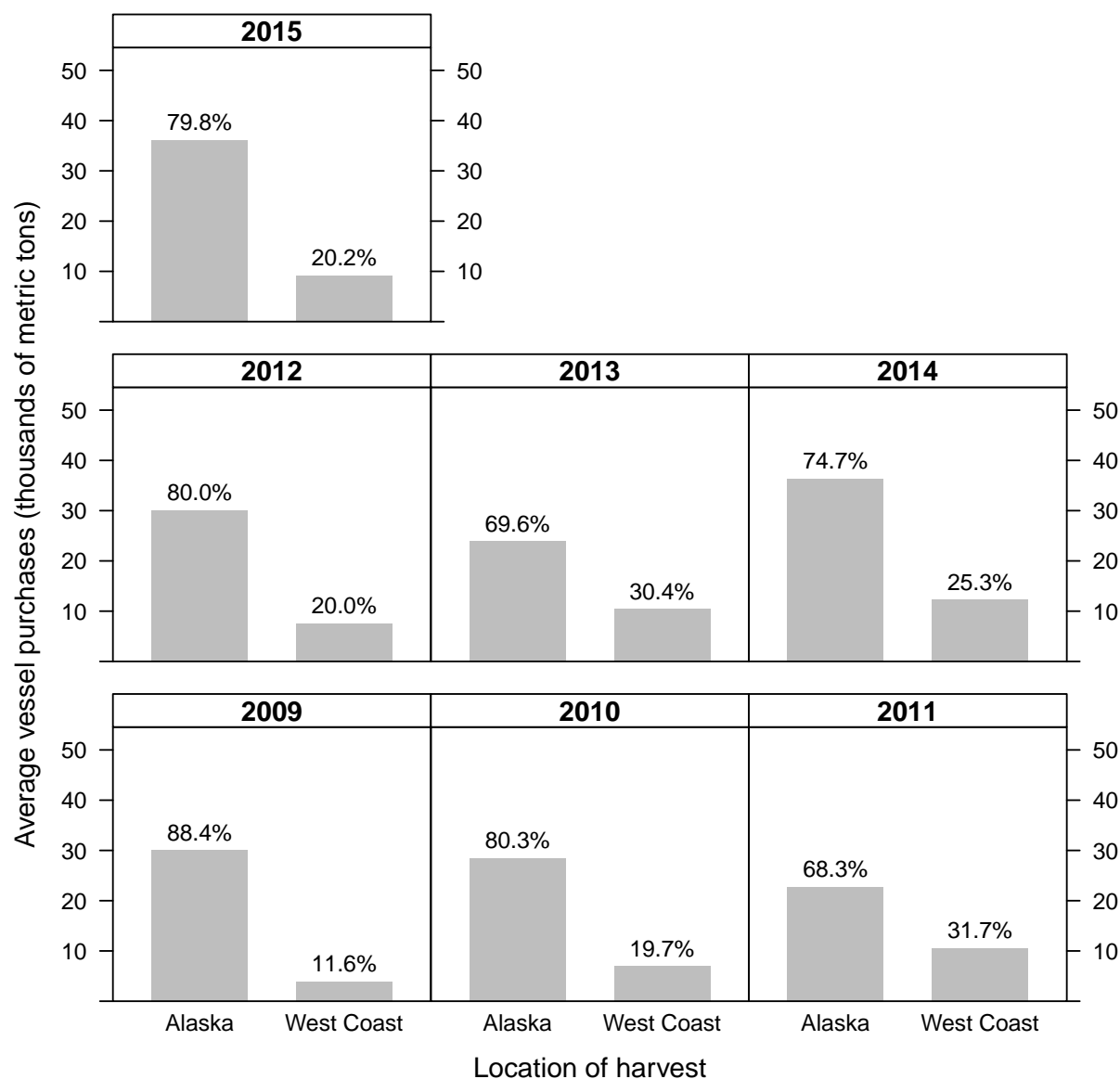


Figure 11: Average annual purchases on the West Coast and Alaska. Average annual purchases (thousands of metric tons) from 2009 to 2015 on the West Coast and in Alaska. Percentages above each bar indicate the portion of the total purchases in that fishery.

7 Revenue

Earnings sources on the EDC survey form include the total value received for processed product, sale or lease of mothership-endorsed permits, chartering, and insurance settlements, though participants have only reported fish production revenue to date. It is possible that vessels may have made end-of-season informal arrangements regarding leftover quota; however, the EDC survey does not capture this type of transfer.

Tables 7.1 and 7.2 summarize annual production in the mothership West Coast whiting sector. Participants provide total weight and value of production by major product categories. These values include any post-season adjustments for products produced during the survey year. Not included in the production value are any additional payments received to cover shipping, handling, or storage costs associated with the sale beyond the free-on-board (buyer assumes responsibility and liability for the product and pays shipping costs) port of discharge. The revenue only includes West Coast activities.

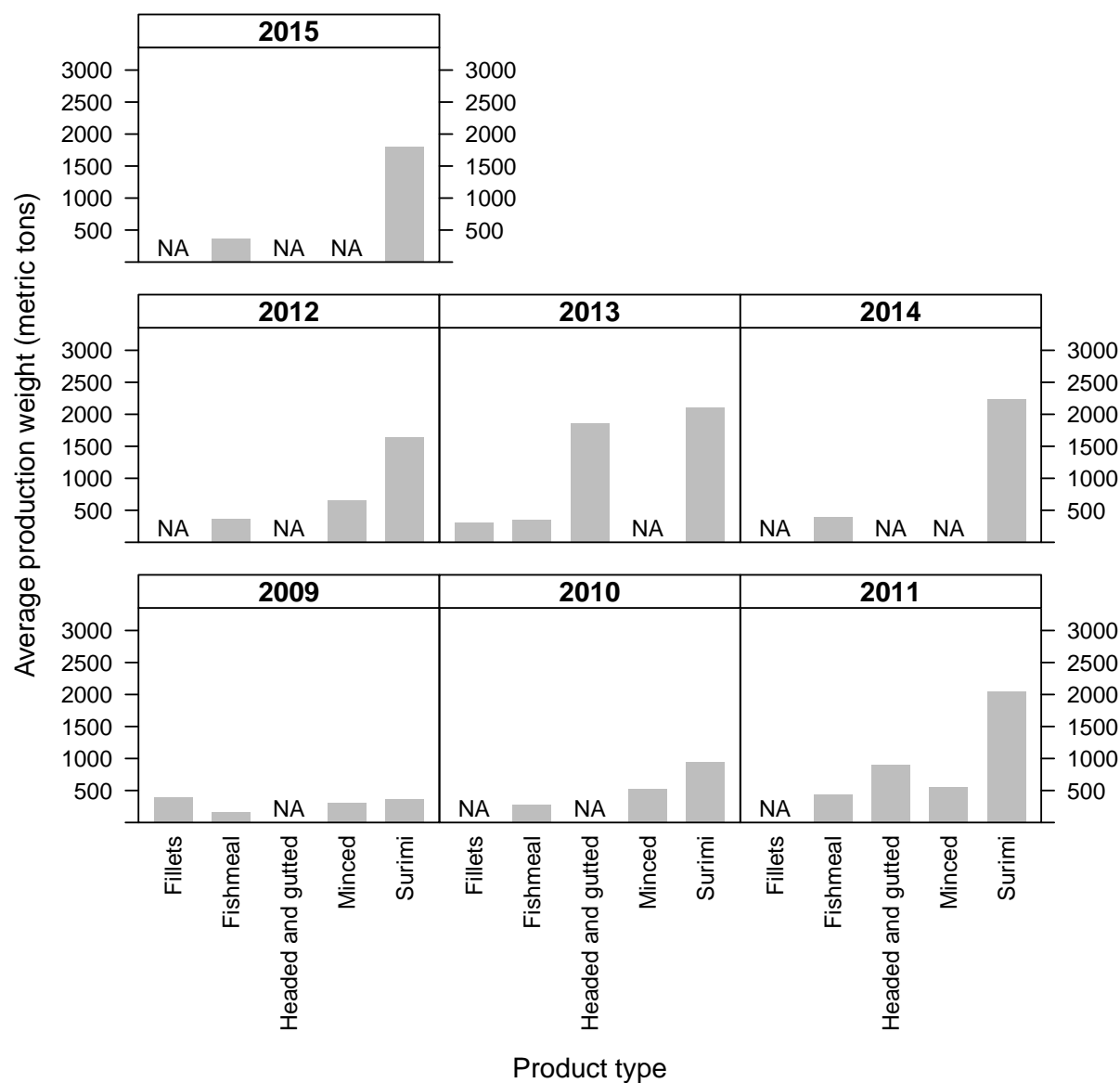


Figure 12: Whiting production weight by product type. Average whiting production weight (metric tons) by product type per vessel, excluding categories where no vessel reported production weight in any years. “NA” is shown where data are confidential.

Table 7.1: Whiting production weight by product type. Average whiting production weight (metric tons) of Pacific whiting by product type per vessel (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Filletts	398 [*]	4	***	***	***	***	***	***	307 [†]	3	***	***	***	***
Fish oil		0		0	***	***	***	***	***	***	***	***	***	***
Fishmeal	166 [†]	5	278 [*]	5	437 [†]	4	372 [†]	4	344 [†]	4	390 [†]	5	369 [*]	3
Headed and gutted	***	***	***	***	902 [†]	3	***	***	1,860 [*]	3	***	***	***	***
Minced	309 [*]	4	522 [†]	3	547 [†]	4	653 [†]	3	***	***	***	***	***	***
Roe		0		0		0		0	***	***		0		0
Round	***	***		0	***	***	***	***	***	***		0		0
Stomachs		0		0		0		0		0		0		0
Surimi	358 [†]	5	940 [†]	6	2,040 [†]	4	1,647 [†]	4	2,108 [†]	4	2,235 [†]	5	1,801 [*]	3
Other	***	***		0		0		0		0		0		0
Average total weight	1,528 [†]	6	1,883 [*]	6	3,552 [†]	5	3,739 [†]	5	5,212 [†]	5	4,002 [*]	5	2,803 [*]	3

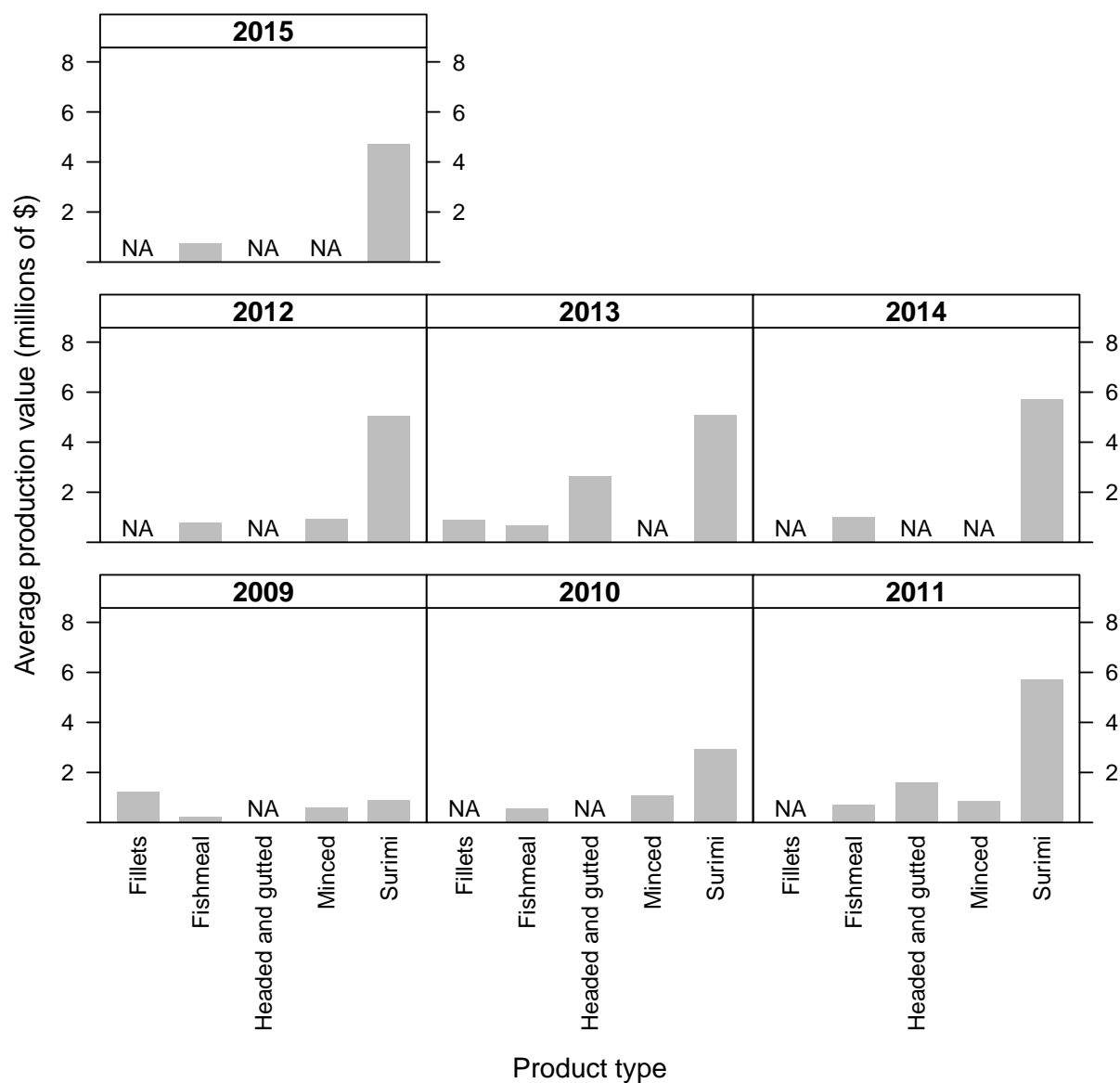


Figure 13: Whiting production value by product type. Average whiting production value (millions of \$) by product type per vessel, excluding categories where no vessel reported production values in any years. “NA” is shown where data are confidential.

Table 7.2: Whiting production value by product type. Average whiting production value (millions of \$) by product type per vessel (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Fillets	\$1.24	4	***	***	***	***	***	***	\$0.90	3	***	***	***	***
Fish oil		0		0	***	***	***	***	***	***	***	***	***	***
Fishmeal	\$0.24	5	\$0.55	5	\$0.71	4	\$0.80	4	\$0.66	4	\$1.00	5	\$0.74	3
Headed and gutted	***	***	***	***	\$1.62	3	***	***	\$2.65	3	***	***	***	***
Minced	\$0.59	4	\$1.08	3	\$0.86	4	\$0.92	3	***	***	***	***	***	***
Roe		0		0		0		0	***	***		0		0
Round	***	***		0	***	***	***	***	***	***		0		0
Stomachs		0		0		0		0		0		0		0
Surimi	\$0.90	5	\$2.95	6	\$5.72	4	\$5.05	4	\$5.08	4	\$5.71	5	\$4.73	3
Other	***	***		0		0		0		0		0		0
Average total value	\$3.01	6	\$4.74	6	\$7.73	5	\$6.05	5	\$7.11	5	\$9.28	5	\$6.76	3

8 Costs

This section describes the cost data that are collected by the EDC Program for the purpose of documenting variable costs, fixed costs, and total costs.

For EDC Program analyses, costs are divided into two categories: variable costs and fixed costs. Variable costs vary with the level of fishery participation, and generally include items such as fuel and crew compensation. Fixed costs do not vary as directly with the level of fishery participation, and generally include items such as vessel capital improvements. The designation of a cost as variable or fixed depends on many factors, including the relevant time horizon and use of the data. While some costs would clearly be considered fixed (e.g., the purchase of a new engine), others are more difficult to categorize. For the purposes of this report, the costs listed in Tables 8.1 and 8.2 to be variable and those costs listed in Tables 8.3, 8.4, 8.5, 9.1, and 9.2 to be fixed. The EDC Program will continue to refine the categorization of these costs.

Fishery participants provide both “capitalized expenditures” and “expenses” for vessel improvements and maintenance, fishing gear, and processing equipment because certain costs may be treated for tax accounting purposes as either capitalized or expensed. Capitalized expenditures are depreciated over a number of years whereas expensed items are fully deducted as a cost for the year in which they are incurred. In an effort to reduce the reporting burden and potential for errors, these data are collected as they are reported in the businesses’ accounting systems.

In order to conduct economic analyses of specific fisheries, it is important to have costs broken out by fishery (*i.e.*, West Coast whiting versus processing in Alaska). It may be feasible for participants to delineate costs at the fishery level for some items, but not for the majority of expenses. During the development of the EDC survey form, a key issue was the determination of which costs could reasonably be broken out by fishery. Each cost item is assigned to one or more categories based on how they are commonly tracked by industry members: 1) used in West Coast fisheries only (West Coast Only); 2) used on the West Coast and in other fisheries (Shared); and 3) used in all fisheries (All) regardless of whether they are used on the West Coast.

Finally, there are a variety of costs that are associated with operating a mothership that are not requested on the form because it is difficult to determine the share of the costs associated with the vessel. These costs include items that can be used for activities other than processing, or are too difficult to allocate to a particular vessel in a multi-vessel company. These expenses include office space, pickup trucks, storage of equipment, professional fees, and marketing. In general, the EDC survey attempts to capture costs that are directly related to vessel maintenance and processing operations, and not costs that are related to activities or equipment off the vessel. For these reasons, the aggregated costs presented here (variable costs, fixed costs, and total costs) underestimate the true costs of operating a business.

8.1 Variable costs

Where possible, data were collected for costs incurred while participating in only West Coast fisheries. Unlike fixed costs, variable costs are directly related to processing operations, and therefore can be more easily differentiated for activities on the West Coast versus other activities. Table 8.1 summarizes variable costs on the West Coast and Table 8.2 summarizes expenses on fish purchases.

Fish purchases

Participants submit information detailing the purchase of whiting and “Other” fish during the year, which is presented along with a calculation of the average annual price per metric ton in Table 8.2. The average price for the season is calculated using the total reported revenue divided by the total reported purchase weight for each vessel for that survey year.

8.2 Fixed costs

Costs on vessel and on-board equipment, fishing gear, and processing equipment

Table 8.3 presents average annual capitalized expenditures. Survey participants are asked to provide capitalized expenditures for the survey year associated with the following categories:

- New and used vessel and on-board equipment: excludes processing equipment and fishing gear, includes all electronics, safety equipment, and machinery not used to process fish. Participants are asked to provide information for **All** fisheries regardless of where the vessel fished.
- Processing Equipment: excludes all equipment, machines, and buildings based primarily on shore, excludes any processing equipment that is not used at least partially in the West Coast whiting fishery, and includes on-board freezers, storage equipment, packing equipment, conveyors, and on-board cargo handling equipment. Participants are asked to separately report costs related to processing equipment **Shared** between the West Coast and other fisheries from those costs related to equipment used only on the **West Coast**.
- Fishing gear: Includes nets, cables, doors, and fishing machinery used in the West Coast whiting fishery, excludes any fishing gear that is not used at least partially in the West Coast whiting fishery. Participants are asked to separately report costs related to fishing gear **Shared** between the West Coast and other fisheries from those costs related to gear used only on the **West Coast**.

Participants are asked to separate capitalized expenditures and expenses on fishing gear and processing equipment used on the West Coast versus those expenses that are shared.

Table 8.1: Variable expenses. Average variable expenses on the West Coast for motherships (thousands of \$) (N = number of vessels with non-zero, non-NA responses).

Expense Category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Additives	29.8 [*]	5	148.9 [*]	6	392.3 [‡]	4	245.1 [‡]	4	363.0 [‡]	4	384.8 [*]	5	347.5 [*]	3
Cargo/product insurance	12.3 [*]	5	11.7 [*]	5	***	***	135.7 [‡]	5	146.5 [‡]	4	176.0 [‡]	5	194.3 [‡]	3
Communication	5.8 [*]	6	4.3 [*]	6	15.7 [‡]	5	8.9 [‡]	5	11.7 [‡]	4	15.0 [‡]	4	13.0 [‡]	3
Food	47.0 [‡]	5	48.0 [*]	6	127.5 [*]	5	136.3 [‡]	5	107.7 [‡]	5	148.1 [*]	5	154.5 [‡]	3
Freight	***	***	***	***	***	***	38.1 [‡]	3	21.9 [‡]	5	24.3 [‡]	4	***	***
Fuel and lubrication	262.0 [*]	6	389.8 [*]	6	1,051.9 [‡]	5	749.8 [*]	5	787.8 [‡]	5	1,019.4 [*]	5	660.5 [*]	3
Non-processing crew	326.0 [‡]	6	411.3 [*]	6	651.6 [‡]	5	492.6 [‡]	5	657.1 [‡]	5	812.5 [‡]	5	754.4 [‡]	3
Observers	15.7 [*]	6	17.0 [*]	6	36.7 [‡]	5	32.9 [*]	5	29.1 [*]	5	37.5 [*]	5	32.2 [*]	3
Offloading	33.6 [‡]	6	30.7 [‡]	6	55.2 [‡]	5	29.2 [‡]	5	70.7 [‡]	4	89.3 [*]	5	***	***
Packing materials	86.6 [*]	6	97.4 [*]	6	228.9 [*]	5	132.7 [‡]	5	152.3 [‡]	5	229.3 [‡]	5	160.4 [*]	3
Processing crew	375.7 [*]	6	534.5 [*]	6	842.7 [*]	5	725.9 [*]	5	736.3 [*]	5	954.6 [*]	5	898.3 [*]	3
Supplies	***	***	40.5 [‡]	4	47.2 [‡]	3	70.4 [‡]	3	118.2 [‡]	3	42.8 [‡]	3	28.7 [‡]	3
Travel	18.2 [‡]	4	14.5 [‡]	4	33.4 [‡]	4	39.2 [*]	4	***	***	***	***	31.9 [‡]	3
Pacific whiting purchases	658.4 [*]	6	1,237.4 [*]	6	2,296.5 [‡]	5	1,845.6 [‡]	5	2,255.6 [‡]	5	2,640.1 [*]	5	1,749.3 [*]	3
Non-whiting fish purchases		0		0		0		0		0		0		0
Average total variable costs	1,864.8 [*]	6	2,973.0 [*]	6	5,811.7 [‡]	5	4,582.3 [‡]	5	5,324.6 [‡]	5	6,581.4 [*]	5	5,112.3 [*]	3

Table 8.2: Fish purchased and received. Average purchase weight (thousands of mt), purchase cost (thousands of \$), purchase price (\$/mt), and weight received but not paid for (thousands of mt) (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Whiting purchased (mt)	4.0 [*]	5	6.2 [*]	5	9.1 [‡]	4	6.7 [*]	4	10.0 [*]	4	12.3 [*]	5	9.2 [*]	3
Whiting purchased (\$)	623.6 [*]	5	1,318.4 [*]	5	2,095.4 [‡]	4	1,631.6 [*]	4	2,215.6 [*]	4	2,640.1 [*]	5	1,749.3 [*]	3
Whiting purchase price (\$/mt)	0.2 [*]	5	0.2 [*]	5	0.2 [*]	4	0.2 [*]	4	0.2 [*]	4	0.2 [*]	5	0.2 [*]	3
Other fish purchased (mt)		0		0		0		0		0		0		0
Other fish purchased (\$)		0		0		0		0		0		0		0
Whiting received but not paid for (mt)	0.1 [*]	3	***	***		0	***	***	***	***	***	***	***	***
Other fish received but not paid for (mt)	***	***	***	***		0		0	***	***		0	***	***

Table 8.3: Capitalized expenditures on gear and equipment. Average capitalized expenditures (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment (N = number of EDC vessels with non-zero, non-NA responses). Note that some expenditures were requested for (a) all fisheries the vessel participates in regardless of where the vessel fished (denoted by “All”), (b) West Coast whiting, Alaska, and other (denoted by “Shared”), and (c) for West Coast fisheries only (Washington, Oregon, and California, denoted by “West Coast”).

Expenditure category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear (Shared)	\$172:	5	***	***	\$685:	3	\$223:	3	***	***	\$124:	4	\$379:	3
Fishing gear (West Coast)	***	***	***	***		0		0		0	***	***		0
Processing equipment (Shared)	\$1,998:	5	\$931:	5	***	***	\$651:	4	\$947:	3	\$588:	5	\$630:	3
Processing equipment (West Coast)		0		0		0		0		0		0		0
Vessel and on-board equipment (All)	\$1,645:	5	\$1,600:	6	\$798:	5	\$2,505:	5	\$3,154:	5	***	***	\$2,447:	3
Average total capitalized expenditures	\$3,181:	6	\$2,714:	6	\$1,454:	5	\$3,160:	5	\$3,863:	5	\$3,460:	5	\$3,457:	3

Table 8.4: Expenses on gear and equipment. Average expenses (thousands of \$) on repair or maintenance of fishing gear, processing equipment, or other vessel and on-board equipment (N = number of vessels with non-zero, non-NA responses). Note that some expenditures were requested for (a) all fisheries the vessel participates in regardless of where the vessel fished (denoted by “All”), (b) West Coast whiting, Alaska, and other (denoted by “Shared”), and (c) for West Coast fisheries only (Washington, Oregon, and California, denoted by “West Coast”).

Expense category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear (Shared)	285.5:	4	***	***	163.4:	5	193.7:	5	151.6:	4	151.6:	4	207.0:	3
Fishing gear (West Coast)	***	***	***	***	***	***		0		0		0		0
Processing equipment (Shared)	406.1:	4	355.2:	5	302.9:	5	631.5:	5	389.4:	4	472.9:	4	539.1:	3
Vessel and on-board equipment (All)	1,549.0:	6	1,330.5:	6	856.4:	5	1,310.4:	4	1,156.0:	5	1,496.6:	5	2,210.0:	3
Average total expenses	2,032.5:	6	1,834.7:	6	1,353.6:	5	1,873.5:	5	1,588.9:	5	1,996.2:	5	2,956.0:	3

Other fixed costs

Participants also provide information about other fixed costs and vessel depreciation, which is summarized in Tables 8.5 and 8.6.

Table 8.5: Other fixed expenses. Average fixed costs (thousands of \$) on all other categories (N = number of vessels with non-zero, non-NA responses).

Cost	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Co-op fees		0		0	***	***	***	***		0	***	***		0
Insurance	1,130 [*]	6	1,177 [*]	6	769 [†]	5	597 [†]	5	399 [*]	5	785 [†]	5	756 [†]	3
Lease of vessel	***	***		0	***	***	***	***	***	***	***	***	***	***
Moorage	363 [*]	6	357 [*]	6	235 [‡]	5	267 [‡]	5	273 [‡]	5	286 [‡]	5	398 [‡]	3
Average total	1,668 [*]	6	1,534 [*]	6	1,012 [*]	5	870 [*]	5	676 [*]	5	1,078 [*]	5	1,160 [*]	3

Table 8.6: Depreciation. Average depreciation (millions of \$) taken during the survey year (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Depreciation	2.15 [*]	6	2.48 [*]	6	2.29 [‡]	5	2.49 [‡]	5	1.56 [‡]	5	2.32 [*]	5	2.82 [*]	3

8.3 Quota and permit costs

Participants submit information on quota and permit expenses. No vessels reported lease or purchase of permits; however, vessels may have made end-of-season informal arrangements regarding leftover quota. The EDC survey does not capture this type of transfer.

Mothership Data Analysis

To fully evaluate cost information and calculate net revenue for specific fisheries, NWFSC economists must do more than summarize data submitted by fishery participants. This section describes the methods used to calculate costs and net revenue for only West Coast fisheries.

9 Cost Disaggregation

Some cost categories on the EDC forms are only incurred while participating in West Coast fisheries, while others include costs incurred while operating in Alaska. For some costs, it may be feasible for participants to break out or track costs at the fishery level. However, for some costs this is not possible. Therefore, cost disaggregation is required to estimate total costs and total cost net revenue on the West Coast. As part of the EDC development process, NWFSC staff met with participants to determine which cost categories could be reported for only West Coast fisheries and which could not, and therefore require further disaggregation. Each cost item is assigned to one or more categories based on how they are commonly tracked by industry members: 1) used in West Coast fisheries only (West Coast Only); 2) used on the West Coast and in other fisheries (Shared); and 3) used in all fisheries (All) regardless of whether they are used on the West Coast.

To disaggregate the West Coast and Alaska costs, we allocate costs proportional to the weight of fish purchased or harvested in each fishery. We calculate the ratio of total West Coast Pacific whiting weight (for all years the vessel has supplied data) to the weight in all fisheries for the same time span:

$$\frac{\sum_y WT_n^{WestCoastMothership}}{\sum_y WT_n^{AllFisheries}}$$

where n is an individual vessel in a season, summed over all years, y , that the vessel has supplied EDC data. Thus, each vessel's ratio of costs being allocated to the West Coast is the same for all years. This

method makes the proportion of costs allocated to the West Coast less sensitive to fluctuations in the TAC for the West Coast Pacific whiting and Alaska fisheries.

For vessels that participated in the tribal sector of the West Coast Pacific whiting fishery, West Coast costs, days at sea, fuel use, and production weight and value have been adjusted to reflect only non-tribal mothership sector activities as needed using a ratio of mothership pounds to all West Coast pounds.

9.1 West Coast portion of fixed costs

Based on the methods described above, information submitted by participants about fixed costs are disaggregated into West Coast-only values and presented in Tables 9.1 and 9.2.

Table 9.1: West Coast portion of fixed costs on gear and equipment. Capitalized expenditures and expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment on the West Coast (N = number of vessels with non-zero, non-NA responses).

Cost	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Fishing gear	97 [‡]	5	***	***	185 [‡]	5	93 [‡]	5	54 [‡]	5	99 [‡]	4	177 [‡]	3
Processing equipment	291 [‡]	6	340 [‡]	6	125 [‡]	5	260 [‡]	5	260 [‡]	5	200 [‡]	5	319 [‡]	3
Vessel and on-board equipment	433 [‡]	6	534 [‡]	6	412 [‡]	5	1,114 [‡]	5	977 [‡]	5	1,417 [‡]	5	1,553 [‡]	3
Average total	804 [‡]	6	1,003 [‡]	6	722 [‡]	5	1,467 [‡]	5	1,291 [‡]	5	1,696 [‡]	5	2,050 [‡]	3

Table 9.2: West Coast costs on insurance, moorage, fees, and leasing. Expenses on insurance, moorage, fees, and leasing on the West Coast (thousands of \$) (N = number of vessels with non-zero, non-NA responses).

Cost	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Co-op fees	0		0		***	***	***	***		0	***	***		0
Insurance	188 [‡]	6	218 [‡]	6	173 [‡]	5	161 [‡]	5	101 [‡]	5	211 [‡]	5	282 [‡]	3
Lease of vessel	***	***		0	***	***	***	***	***	***	***	***	***	***
Moorage	63 [‡]	6	65 [‡]	6	59 [‡]	5	67 [‡]	5	83 [‡]	5	69 [‡]	5	112 [‡]	3
Average total	288 [‡]	6	283 [‡]	6	237 [‡]	5	233 [‡]	5	185 [‡]	5	285 [‡]	5	397 [‡]	3

9.2 Summary of West Coast portion of costs

Table 9.3: Summary of West Coast portion of costs. Average capitalized expenditures and expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment, other fixed costs, and all variable costs on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Cost category	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$804	6	\$1,003	6	\$722	5	\$1,467	5	\$1,291	5	\$1,696	5	\$2,050	3
Total other fixed costs	\$288	6	\$283	6	\$237	5	\$233	5	\$185	5	\$285	5	\$397	3
Total variable costs	\$1,865	6	\$2,973	6	\$5,812	5	\$4,582	5	\$5,325	5	\$6,581	5	\$5,112	3
Average total costs	\$2,957	6	\$4,259	6	\$6,771	5	\$6,282	5	\$6,801	5	\$8,562	5	\$7,559	3

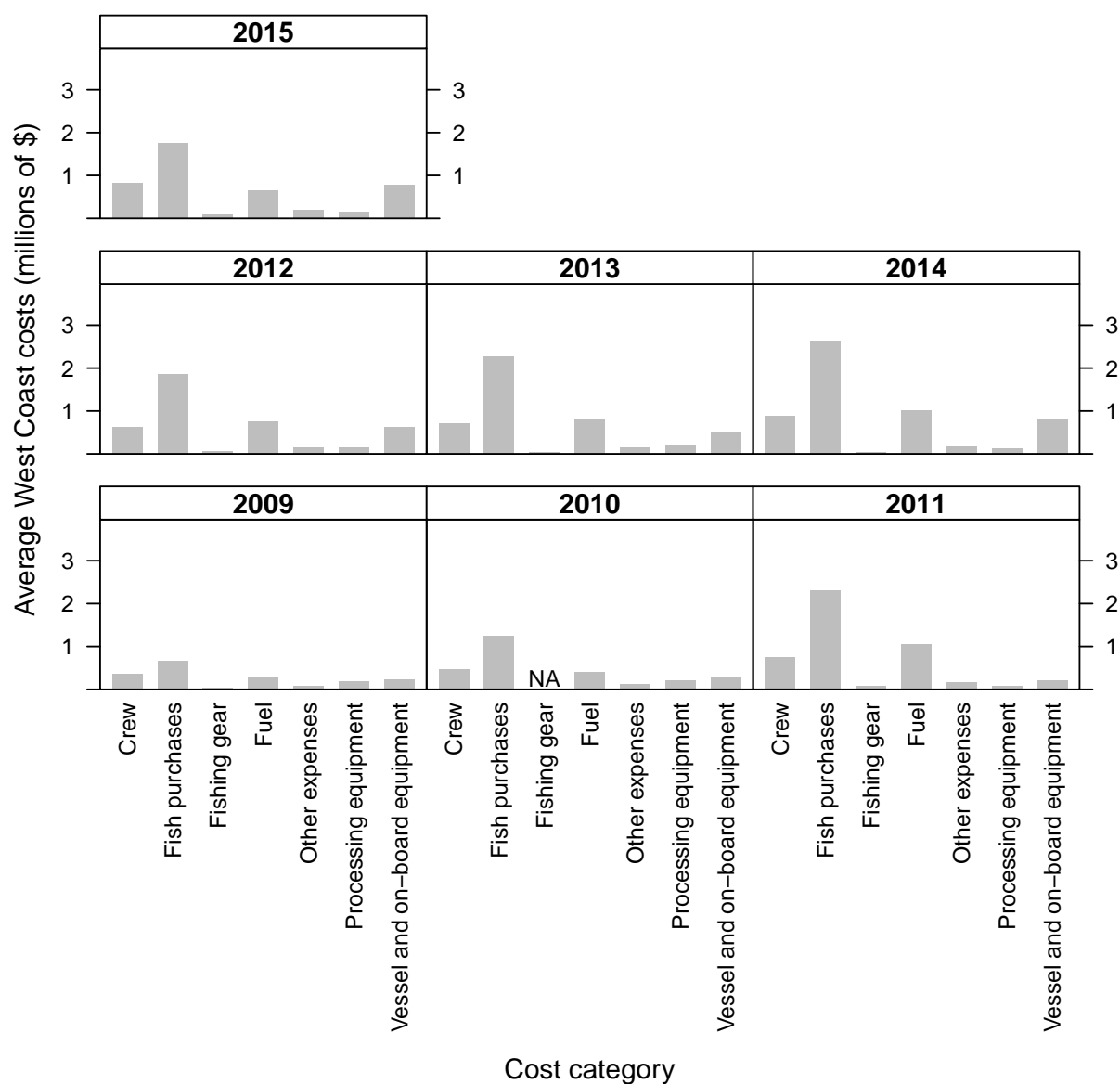


Figure 14: Average costs by category on the West Coast. Average costs by category on the West Coast including capitalized expenditures and annual expenses (millions of \$). Crew includes both processing and non-processing crew expenses. The “Other” category includes expenses on additives, communication, fees, insurance, freight, moorage, observers, offloading, supplies, packing, travel, and Sea-State monitoring. “NA” is shown where data are confidential.

10 Net Economic Benefits

The level of net benefits generated by fishery participants indicates whether an operation is a viable ongoing business, but there are numerous ways to calculate and assess net benefits depending on the data available, including *economic profit*¹ and *net revenue*. Economic profit is an indicator of the long-term viability of fishery operations since it encapsulates all costs, including the opportunity cost of non-cash inputs, and can be used to estimate whether there are incentives or disincentives to invest in capital or enter and leave the fishery. However, calculations of economic profit are beyond the scope of these reports because the EDC Program does not collect information on opportunity costs.

The EDC Program calculates a monetary, financial measure of a participant's net cash flow by subtracting monetary costs from gross revenue, which we call net revenue. The only costs that are included are those that are actually paid or associated with a financial transaction. Net revenue therefore measures the annual financial well-being of a participant's operation and can be used to assess how changes in fishery management may affect monetary gains or losses.

10.1 Net revenue

Net revenue is calculated two ways: using only variable costs, and using variable costs plus fixed costs (total costs).² The first calculation is called variable cost net revenue, while the second is called total cost net revenue (Figure 15). Variable cost net revenue is useful for examining changes in fishery operations that likely do not affect fixed costs. For example, the cost of processing an additional metric ton of fish is most representative of the true costs when only variable costs are considered. Total cost net revenue is generally a better measure of financial gain or loss for an entire year, season, or fishery.

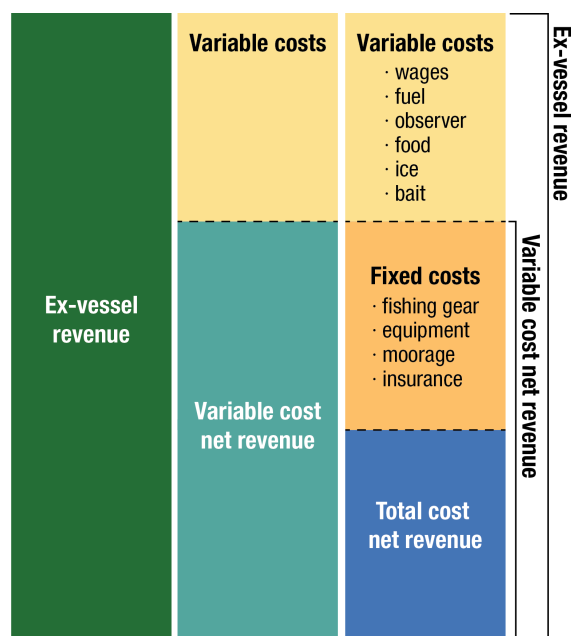


Figure 15: Composition and derivation of variable and total cost net revenue used in the EDC Program analysis of revenue, costs, and economic performance.

There are two caveats associated with the net revenue calculations in this report. First, as noted in Section 4, there are certain costs associated with operating a vessel that are not requested on the EDC

¹ Whitmarsh D., James C., Pickering H., Neiland A. 2000. The profitability of marine commercial fisheries: a review of economic information needs with particular reference to the UK. *Marine Policy*, Vol. 24(3), pp. 257-263.

² See Section 8 for a more complete discussion of variable and fixed costs used in this report.

form either because it is difficult to determine the share of the cost associated with the vessel, because costs pertain to items used for activities other than catching or processing fish, or are too difficult to allocate to a particular vessel in a multi-vessel company. These costs include office space, vehicles and transport trucks, storage of equipment, professional fees, and income taxes. Therefore, the net revenue presented here is likely an overestimate of true net revenue.

Second, the EDC forms do not collect information about financing costs of large purchases and investments. Instead of using principal and interest payment information in calculations of net revenue, we therefore must use the total costs associated with the purchases, repair, maintenance, or improvements. For example, if a new engine is purchased, the total cost of the engine is used in the year that it was reported even though the actual cash outlay, if it were financed, would only be the principal and interest payments. It is likely that many larger capital costs, and perhaps some operating costs, are financed. This would mean that the actual cash outlays in a particular year for those items would be less than what is used in the EDC net revenue calculation. This may largely balance out over time because previously financed capital is also not included. Moreover, total cost net revenue is expected to be representative of actual total cost net revenue only when averaged over many years and across participants because relatively large capital costs only occur periodically.

Net revenue for all West Coast fishing activities

Average net revenue is calculated for all activities on the West Coast. West Coast revenue only includes revenue from production of fish. The variable and fixed costs do not include costs related to acquiring limited entry permits, quota shares, or quota pounds.

$$\text{Variable cost net revenue} = \text{West Coast revenue} - \text{West Coast variable costs}$$

$$\text{Total cost net revenue} = \text{West Coast revenue} - (\text{West Coast variable costs} + \text{West Coast fixed costs})$$

Table 10.1: West Coast variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast (millions of \$) (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$3.01	6	\$4.74	6	\$7.73	5	\$6.05	5	\$7.12	5	\$9.28	5	\$6.76	3
(Variable costs)	\$1.86	6	\$2.97	6	\$5.81	5	\$4.58	5	\$5.32	5	\$6.58	5	\$5.11	3
Variable cost net revenue	\$1.14	6	\$1.76	6	\$1.91	5	\$1.47	5	\$1.79	5	\$2.70	5	\$1.64	3
(Fixed costs)	\$1.09	6	\$1.29	6	\$0.96	5	\$1.70	5	\$1.48	5	\$1.98	5	\$2.45	3
Total cost net revenue	\$0.05	6	\$0.48	6	\$0.95	5	-\$0.23	5	\$0.32	5	\$0.71	5	-\$0.80	3

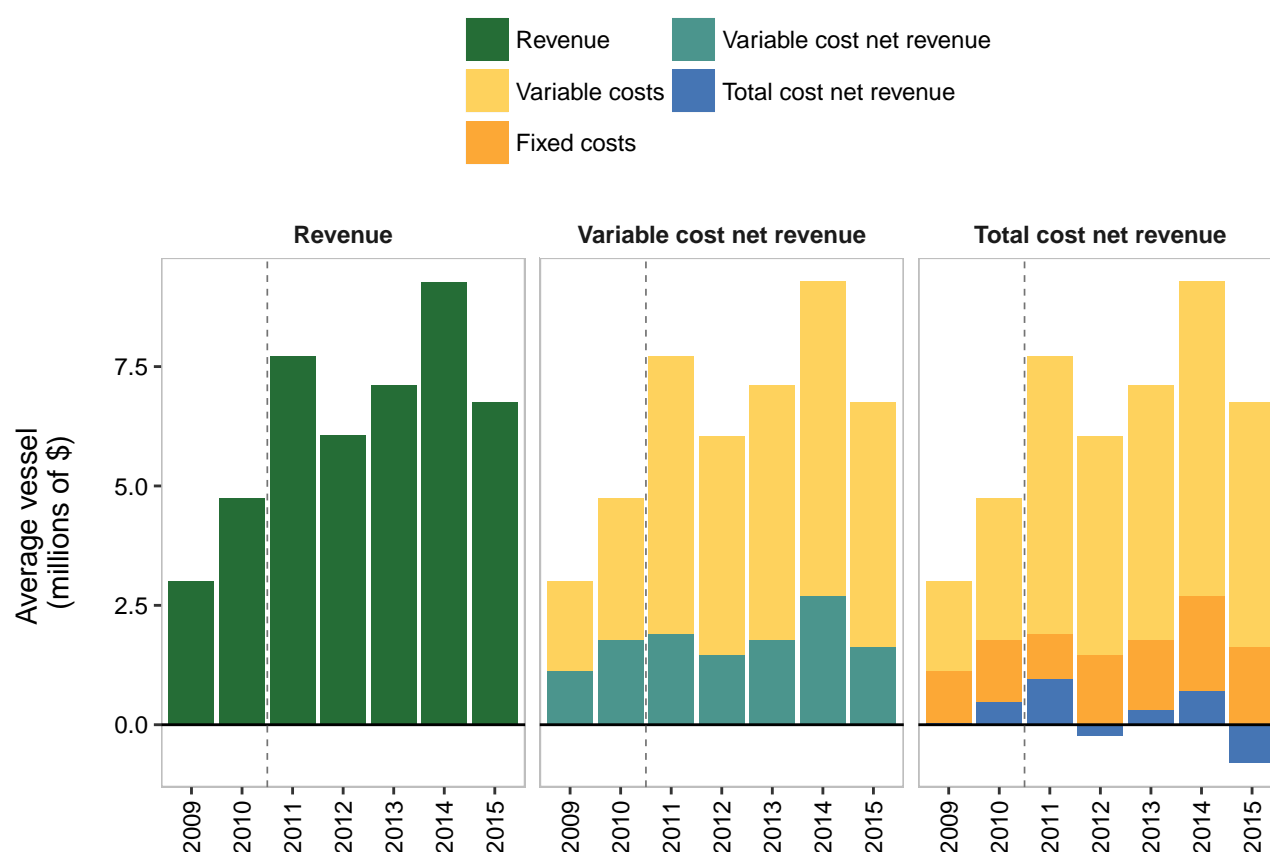


Figure 16: Average total reported revenue (left), average variable cost net revenue (revenue minus variable costs) (middle), and average total cost net revenue (revenue minus variable costs and fixed costs) (right) (millions of \$). Dashed line represents the beginning of the catch share program.

11 Economic Performance: Cost, Revenue, Net Revenue, Markup, and Product Recovery Rates

Net revenue rates

Tables 11.1, 11.2, and 11.3 provide revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue by days at sea (West Coast processing and steaming), metric ton of fish produced, and metric ton of fish purchased. Rates are calculated as vessel averages and thus reflect the operations of the average vessel and not the fleet as a whole.

Table 11.1: Revenue, costs, and net revenue per day. Mean revenue, variable costs, fixed costs, variable cost net revenue, and total cost net revenue per day (thousands of \$).

Per day	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$152.3	6	\$150.6	6	\$110.0	5	\$116.6	5	\$127.4	5	\$153.8	5	\$121.9	3
(Variable costs)	\$93.9	6	\$93.4	6	\$86.4	5	\$93.1	5	\$93.0	5	\$113.8	5	\$91.6	3
Variable cost net revenue	\$58.4	6	\$57.2	6	\$23.6	5	\$23.5	5	\$34.4	5	\$39.9	5	\$30.3	3
(Fixed costs)	\$55.6	6	\$41.7	6	\$15.5	5	\$34.1	5	\$28.2	5	\$31.6	5	\$44.8	3
Total cost net revenue	\$2.8	6	\$15.4	6	\$8.1	5	-\$10.6	5	\$6.2	5	\$8.4	5	-\$14.4	3

Table 11.2: Revenue, costs, and net revenue per metric ton produced. Mean revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue per metric ton produced (\$).

Per mt produced	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$2,160	6	\$2,647	6	\$2,000	5	\$1,715	5	\$1,588	5	\$2,267	5	\$2,440	3
(Variable costs)	\$1,314	6	\$1,639	6	\$1,588	5	\$1,655	5	\$1,199	5	\$1,668	5	\$1,819	3
Variable cost net revenue	\$847	6	\$1,008	6	\$412	5	\$60	5	\$390	5	\$599	5	\$620	3
(Fixed costs)	\$873	6	\$741	6	\$288	5	\$845	5	\$367	5	\$465	5	\$878	3
Total cost net revenue	-\$26	6	\$266	6	\$124	5	-\$785	5	\$22	5	\$134	5	-\$258	3

Table 11.3: Net revenue per metric ton purchased. Mean revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue per metric ton purchased (\$).

Per mt purchased	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Variable cost net revenue	\$307	6	\$276	6	\$133	5	-\$44	5	\$158	5	\$196	5	\$204	3
Total cost net revenue	-\$1	6	\$68	6	\$31	5	-\$496	5	\$0	5	\$47	5	-\$44	3

Markup and product recovery rates

The product markup for the mothership whiting sector represents the difference between the final processed product value and the cost of fish purchased from vessels, calculated using the formula

$$\frac{\sum_{n=1}^N R_n}{\sum_{n=1}^N C_n}$$

where N is the number of motherships that processed on the West Coast, R is the value of production for each mothership vessel, and C is the cost of fish purchases by each mothership vessel. The average markup is calculated for each survey year (Table 11.4).

Table 11.4: Markup rate. The markup rate (total value of production divided by total cost of fish purchases) for motherships on the West Coast (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Markup	4.57 [*]	6	3.83 [*]	6	3.36 [*]	5	3.28 [*]	5	3.15 [*]	5	3.51 [*]	5	3.86 [*]	3

The product recovery rate for the mothership whiting sector (Table 11.5) is calculated as

$$\frac{\sum_{n=1}^N WT_n^{fishoutputs}}{\sum_{n=1}^N WT_n^{fishinputs}}$$

where N is the number of motherships that purchased fish on the West Coast, $WT_n^{fishoutputs}$ is the weight of fish produced by each mothership vessel, and $WT_n^{fishinputs}$ is the weight of fish purchases from catcher vessels by each mothership vessel. The average product recovery rate is calculated for each survey year (Table 11.5).

Table 11.5: Product recovery rate. The product recovery rate (total weight of production divided by total weight of fish purchases) for motherships on the West Coast (N = number of vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Product recovery rate	0.39	6	0.27	6	0.34	5	0.50	5	0.50	5	0.33	5	0.31	3